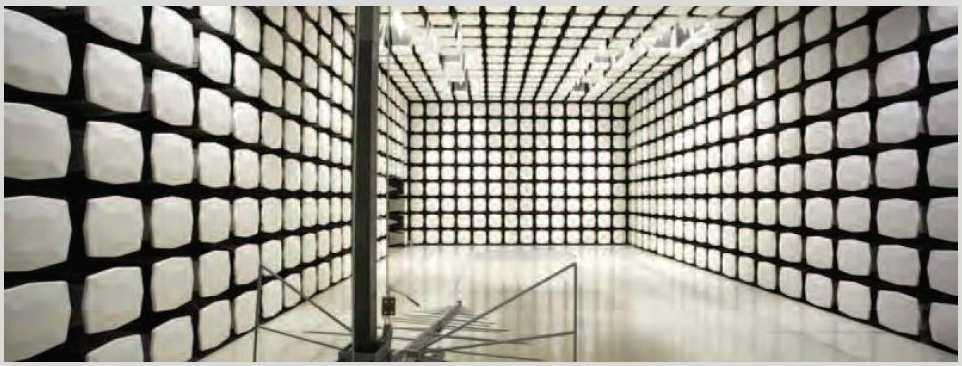
NORTHWEST EMC

FAIRWAYiQ

FAIRWAYiQ Smart Tag, Model FIQ-01

FCC 15.207:2016
FCC 15.247:2016
902-928 MHz Transceiver

Report # RIGA0008



NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: June 2, 2016
FAIRWAYiQ
Model: FAIRWAYiQ Smart Tag, Model FIQ-01

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC - Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	Characterization of radio test software
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	No	N/A	Characterization of radio operation
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2016.3.22

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

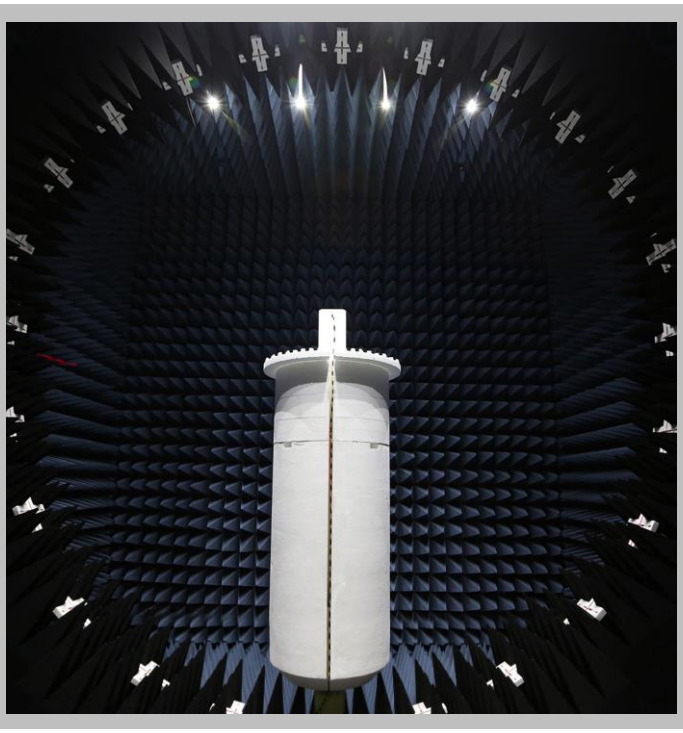
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

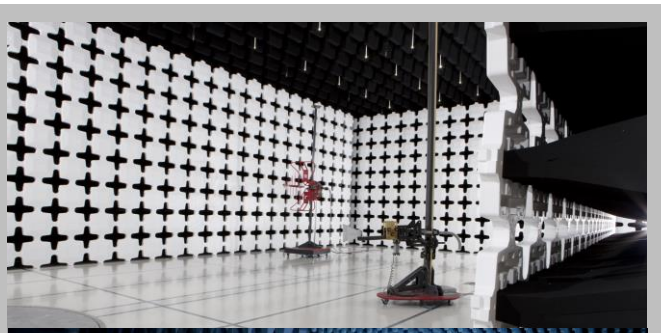
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.0 dB	-5.0 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

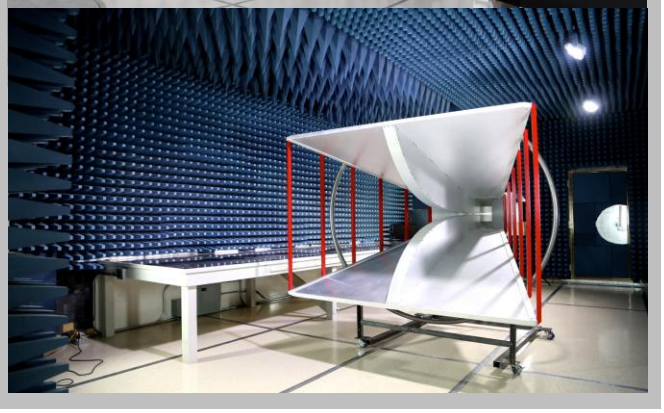
FACILITIES

NORTHWEST EMC
REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	FAIRWAYiQ
Address:	300 Bear Hill Rd
City, State, Zip:	Waltham, MA 02451
Test Requested By:	Mark Bielman of Rigado LLC
Model:	FAIRWAYiQ Smart Tag, Model FIQ-01
First Date of Test:	May 18, 2016
Last Date of Test:	June 2, 2016
Receipt Date of Samples:	May 18, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Two radio device that is used on a golf course for tracking golfer positions on the course. Units are turned ON by a BLE beacon. The units use GPS for location to a centrally located Gateway using a LoRa 900 mHz radio.

Testing Objective:
Seeking to demonstrate compliance under FCC 15.247:2016 for operation in the 902 - 928 MHz Band.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration RIGA0008- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Tracker/GPS device	FAIRWAYiQ	FAIRWAYiQ Smart Tag, Model FIQ-01	7369

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Dell	HA10USNM130	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Micro USB	Yes	1.0m	No	Tracker/GPS device	AC Adapter

Configuration RIGA0008- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Tracker/GPS device	FAIRWAYiQ	FAIRWAYiQ Smart Tag, Model FIQ-01	7371

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Dell	HA10USNM130	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Micro USB	Yes	1.0m	No	Tracker/GPS device	AC Adapter

Configuration RIGA0008- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Tracker/GPS device	FAIRWAYiQ	FAIRWAYiQ Smart Tag, Model FIQ-01	7373

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Dell	HA10USNM130	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Micro USB	Yes	1.0m	No	Tracker/GPS device	AC Adapter

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	5/18/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
2	5/18/2016	AC - Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
3	5/22/2016	Carrier Frequency Separation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
4	5/22/2016	Dwell Time	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	5/23/2016	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	5/23/2016	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	5/23/2016	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
8	5/23/2016	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
9	6/2/2016	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
10	6/2/2016	Band Edge Compliance – Hoping Mode	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARH	3/21/2016	3/21/2017
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	5/10/2016	5/10/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	1/27/2015	1/27/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

RIGA0008-1

MODES INVESTIGATED

Mid channel 902.9 MHz, channel spreading factor 7

AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01	Work Order:	RIGA0008
Serial Number:	7369	Date:	05/18/2016
Customer:	FAIRWAYiQ	Temperature:	23.1°C
Attendees:	Mark Bielman	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1020 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	5.0 VDC via 110VAC/60Hz	Configuration:	RIGA0008-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	2	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

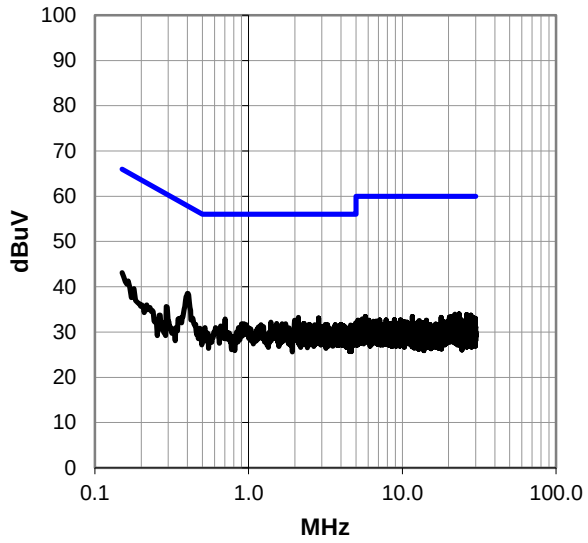
EUT OPERATING MODES

Mid channel 902.9 MHz, channel spreading factor 7

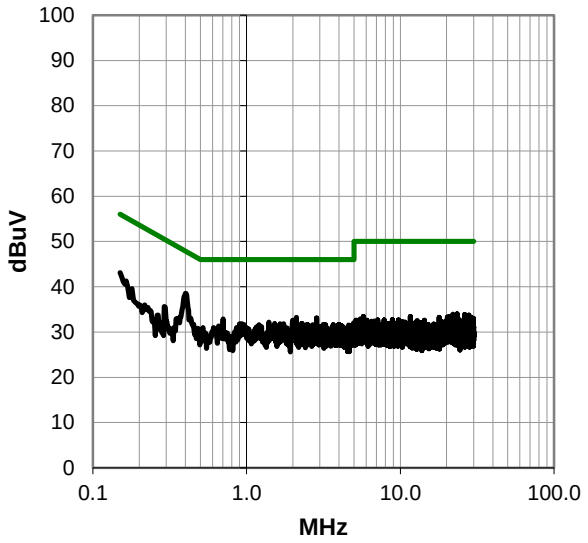
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #2

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.400	18.8	19.7	38.5	57.9	-19.4
2.105	13.4	19.8	33.2	56.0	-22.8
2.851	13.3	19.8	33.1	56.0	-22.9
0.150	23.2	19.9	43.1	66.0	-22.9
0.702	13.2	19.7	32.9	56.0	-23.1
1.989	12.8	19.8	32.6	56.0	-23.4
1.396	12.4	19.8	32.2	56.0	-23.8
4.966	12.1	20.0	32.1	56.0	-23.9
1.519	12.1	19.8	31.9	56.0	-24.1
2.280	12.1	19.8	31.9	56.0	-24.1
2.303	12.1	19.8	31.9	56.0	-24.1
0.933	12.1	19.7	31.8	56.0	-24.2
1.650	12.0	19.8	31.8	56.0	-24.2
1.739	12.0	19.8	31.8	56.0	-24.2
2.482	11.9	19.8	31.7	56.0	-24.3
3.161	11.8	19.9	31.7	56.0	-24.3
3.254	11.8	19.9	31.7	56.0	-24.3
3.989	11.8	19.9	31.7	56.0	-24.3
1.202	11.8	19.8	31.6	56.0	-24.4
2.691	11.8	19.8	31.6	56.0	-24.4
3.661	11.7	19.9	31.6	56.0	-24.4
4.601	11.6	19.9	31.5	56.0	-24.5
2.527	11.7	19.8	31.5	56.0	-24.5
3.269	11.6	19.9	31.5	56.0	-24.5
4.694	11.5	19.9	31.4	56.0	-24.6
4.153	11.5	19.9	31.4	56.0	-24.6

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.400	18.8	19.7	38.5	47.9	-9.4
2.105	13.4	19.8	33.2	46.0	-12.8
2.851	13.3	19.8	33.1	46.0	-12.9
0.150	23.2	19.9	43.1	56.0	-12.9
0.702	13.2	19.7	32.9	46.0	-13.1
1.989	12.8	19.8	32.6	46.0	-13.4
1.396	12.4	19.8	32.2	46.0	-13.8
4.966	12.1	20.0	32.1	46.0	-13.9
1.519	12.1	19.8	31.9	46.0	-14.1
2.280	12.1	19.8	31.9	46.0	-14.1
2.303	12.1	19.8	31.9	46.0	-14.1
0.933	12.1	19.7	31.8	46.0	-14.2
1.650	12.0	19.8	31.8	46.0	-14.2
1.739	12.0	19.8	31.8	46.0	-14.2
2.482	11.9	19.8	31.7	46.0	-14.3
3.161	11.8	19.9	31.7	46.0	-14.3
3.254	11.8	19.9	31.7	46.0	-14.3
3.989	11.8	19.9	31.7	46.0	-14.3
1.202	11.8	19.8	31.6	46.0	-14.4
2.691	11.8	19.8	31.6	46.0	-14.4
3.661	11.7	19.9	31.6	46.0	-14.4
4.601	11.6	19.9	31.5	46.0	-14.5
2.527	11.7	19.8	31.5	46.0	-14.5
3.269	11.6	19.9	31.5	46.0	-14.5
4.694	11.5	19.9	31.4	46.0	-14.6
4.153	11.5	19.9	31.4	46.0	-14.6

CONCLUSION

Pass

Tested By

AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01	Work Order:	RIGA0008
Serial Number:	7369	Date:	05/18/2016
Customer:	FAIRWAYiQ	Temperature:	23.1°C
Attendees:	Mark Bielman	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure:	1020 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	5.0 VDC via 110VAC/60Hz	Configuration:	RIGA0008-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

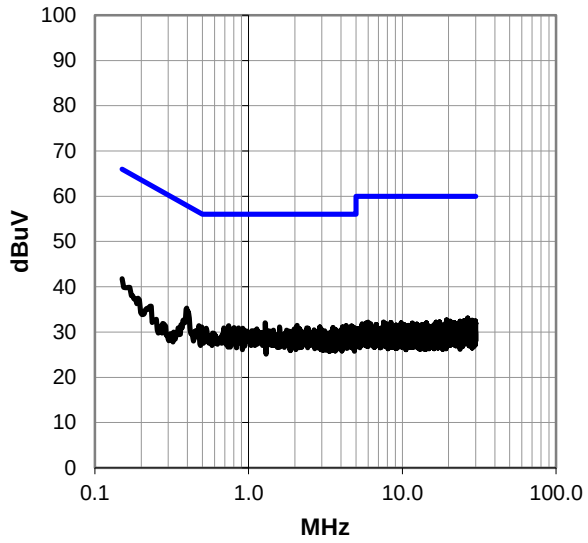
EUT OPERATING MODES

Mid channel 902.9 MHz, channel spreading factor 7

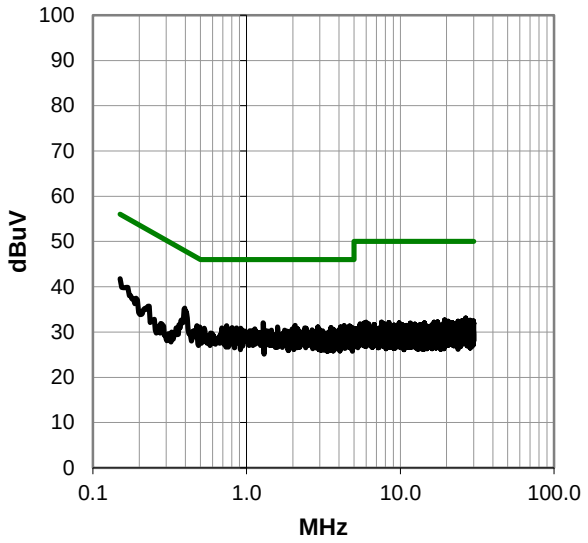
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #3

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.396	15.6	19.7	35.3	57.9	-22.6
1.284	12.2	19.8	32.0	56.0	-24.0
0.150	21.9	19.9	41.8	66.0	-24.2
2.068	11.7	19.8	31.5	56.0	-24.5
0.743	11.7	19.7	31.4	56.0	-24.6
4.310	11.5	19.9	31.4	56.0	-24.6
4.679	11.4	19.9	31.3	56.0	-24.7
2.911	11.3	19.8	31.1	56.0	-24.9
1.590	11.3	19.8	31.1	56.0	-24.9
4.090	11.2	19.9	31.1	56.0	-24.9
0.497	11.4	19.7	31.1	56.1	-25.0
4.828	11.1	19.9	31.0	56.0	-25.0
0.807	11.3	19.7	31.0	56.0	-25.0
3.541	11.1	19.9	31.0	56.0	-25.0
0.475	11.7	19.7	31.4	56.4	-25.0
2.392	11.1	19.8	30.9	56.0	-25.1
0.691	11.2	19.7	30.9	56.0	-25.1
0.863	11.2	19.7	30.9	56.0	-25.1
4.758	10.9	19.9	30.8	56.0	-25.2
0.915	11.1	19.7	30.8	56.0	-25.2
0.531	11.1	19.7	30.8	56.0	-25.2
2.437	11.0	19.8	30.8	56.0	-25.2
1.131	10.9	19.8	30.7	56.0	-25.3
1.978	10.9	19.8	30.7	56.0	-25.3
2.150	10.9	19.8	30.7	56.0	-25.3
4.787	10.7	19.9	30.6	56.0	-25.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.396	15.6	19.7	35.3	47.9	-12.6
1.284	12.2	19.8	32.0	46.0	-14.0
0.150	21.9	19.9	41.8	56.0	-14.2
2.068	11.7	19.8	31.5	46.0	-14.5
0.743	11.7	19.7	31.4	46.0	-14.6
4.310	11.5	19.9	31.4	46.0	-14.6
4.679	11.4	19.9	31.3	46.0	-14.7
2.911	11.3	19.8	31.1	46.0	-14.9
1.590	11.3	19.8	31.1	46.0	-14.9
4.090	11.2	19.9	31.1	46.0	-14.9
0.497	11.4	19.7	31.1	46.1	-15.0
4.828	11.1	19.9	31.0	46.0	-15.0
0.807	11.3	19.7	31.0	46.0	-15.0
3.541	11.1	19.9	31.0	46.0	-15.0
0.475	11.7	19.7	31.4	46.4	-15.0
2.392	11.1	19.8	30.9	46.0	-15.1
0.691	11.2	19.7	30.9	46.0	-15.1
0.863	11.2	19.7	30.9	46.0	-15.1
4.758	10.9	19.9	30.8	46.0	-15.2
0.915	11.1	19.7	30.8	46.0	-15.2
0.531	11.1	19.7	30.8	46.0	-15.2
2.437	11.0	19.8	30.8	46.0	-15.2
1.131	10.9	19.8	30.7	46.0	-15.3
1.978	10.9	19.8	30.7	46.0	-15.3
2.150	10.9	19.8	30.7	46.0	-15.3
4.787	10.7	19.9	30.6	46.0	-15.4

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

High Channel 903.7 MHz, spreading factor 10
High Channel 903.7 MHz, spreading factor 7
Low Channel 902.3 MHz, spreading factor 7

POWER SETTINGS INVESTIGATED

5.0 VDC

CONFIGURATIONS INVESTIGATED

RIGA0008 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	10 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	None	Standard Gain Horns Cable	EVF	3/11/2016	12
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HFT	1/29/2016	12
Filter - High Pass	Micro-Tronics	HPM50108	HFV	3/22/2016	12
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12
Antenna - Double Ridge	EMCO	3115	AHC	6/13/2014	24
Filter - Low Pass	Micro-Tronics	LPM50003	LFB	5/24/2015	12
Cable	N/A	Bilog Cables	EVA	3/11/2016	12
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12

TEST DESCRIPTION

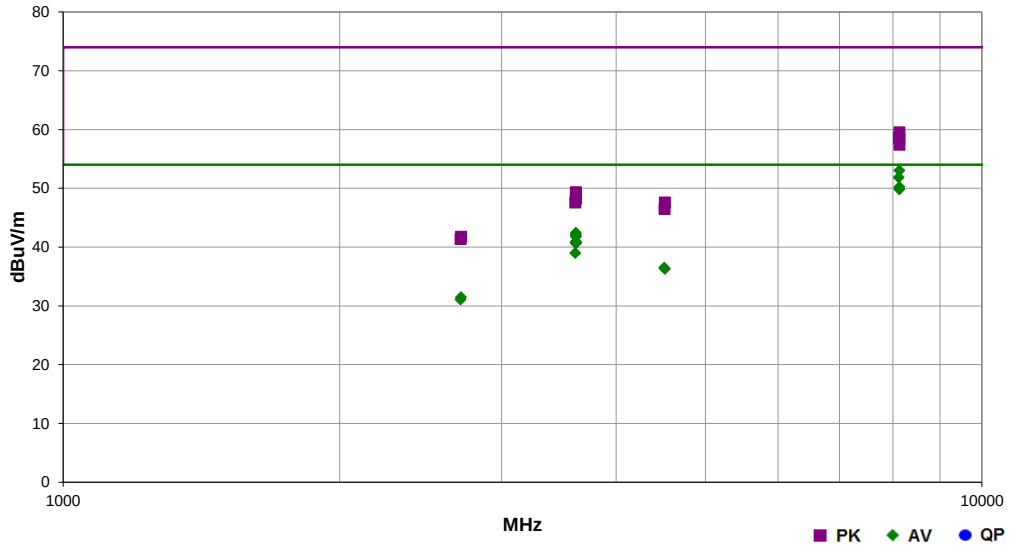
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

SPURIOUS RADIATED EMISSIONS

Work Order:	RIGA0008	**Date:**	05/18/16		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	45.9% RH		
Serial Number:	7369	**Barometric Pres.:**	1022 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01				
Configuration:	1				
Customer:	FAIRWAYiQ				
Attendees:	Mark Bielman				
EUT Power:	5.0 VDC				
Operating Mode:	See comments				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

Run #	17	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8133.010	35.5	17.5	2.3	297.0	3.0	0.0	Horz	AV	0.0	53.0	54.0	-1.0	High Channel 903.7 MHz, spreading factor 7, EUT Vert
8120.550	34.3	17.5	1.8	345.0	3.0	0.0	Horz	AV	0.0	51.8	54.0	-2.2	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
8133.145	32.7	17.5	1.0	255.0	3.0	0.0	Vert	AV	0.0	50.2	54.0	-3.8	High Channel 903.7 MHz, spreading factor 7, EUT Vert
8133.030	32.3	17.5	1.7	341.0	3.0	0.0	Horz	AV	0.0	49.8	54.0	-4.2	High Channel 903.7 MHz, spreading factor 10, EUT Vert
3614.830	35.4	7.0	1.2	40.0	3.0	0.0	Horz	AV	0.0	42.4	54.0	-11.6	High Channel 903.7 MHz, spreading factor 10, EUT on side
3614.950	35.1	7.0	1.2	340.0	3.0	0.0	Vert	AV	0.0	42.1	54.0	-11.9	High Channel 903.7 MHz, spreading factor 10, EUT Vert
3614.805	34.8	7.0	1.0	43.0	3.0	0.0	Horz	AV	0.0	41.8	54.0	-12.2	High Channel 903.7 MHz, spreading factor 10, EUT Vert
3614.750	34.8	7.0	2.8	41.0	3.0	0.0	Horz	AV	0.0	41.8	54.0	-12.2	High Channel 903.7 MHz, spreading factor 7, EUT Vert
3614.750	33.9	7.0	1.2	340.0	3.0	0.0	Vert	AV	0.0	40.9	54.0	-13.1	High Channel 903.7 MHz, spreading factor 7, EUT Vert
3614.685	33.8	7.0	1.0	130.0	3.0	0.0	Horz	AV	0.0	40.8	54.0	-13.2	High Channel 903.7 MHz, spreading factor 10, EUT Horz
3614.960	33.7	7.0	1.0	306.0	3.0	0.0	Vert	AV	0.0	40.7	54.0	-13.3	High Channel 903.7 MHz, spreading factor 10, EUT Horz
3614.585	33.6	7.0	1.0	32.0	3.0	0.0	Vert	AV	0.0	40.6	54.0	-13.4	High Channel 903.7 MHz, spreading factor 10, EUT on side
8132.970	42.0	17.5	2.3	296.0	3.0	0.0	Horz	PK	0.0	59.5	74.0	-14.5	High Channel 903.7 MHz, spreading factor 7, EUT Vert
3609.292	32.0	7.0	1.0	44.0	3.0	0.0	Horz	AV	0.0	39.0	54.0	-15.0	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
8121.133	41.1	17.5	1.8	345.0	3.0	0.0	Horz	PK	0.0	58.6	74.0	-15.4	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
8132.870	40.9	17.5	1.0	255.0	3.0	0.0	Vert	PK	0.0	58.4	74.0	-15.6	High Channel 903.7 MHz, spreading factor 7, EUT Vert
8132.755	39.9	17.5	1.7	341.0	3.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	High Channel 903.7 MHz, spreading factor 10, EUT Vert
4511.492	27.7	8.8	3.5	318.0	3.0	0.0	Horz	AV	0.0	36.5	54.0	-17.5	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
4520.050	27.5	8.8	1.0	166.0	3.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	High Channel 903.7 MHz, spreading factor 7, EUT Vert
2711.055	31.5	0.0	1.0	175.0	3.0	0.0	Horz	AV	0.0	31.5	54.0	-22.5	High Channel 903.7 MHz, spreading factor 7, EUT Vert
2707.075	31.1	0.0	1.0	4.0	3.0	0.0	Horz	AV	0.0	31.1	54.0	-22.9	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
3614.640	42.3	7.0	1.2	40.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	High Channel 903.7 MHz, spreading factor 10, EUT on side
3614.790	42.0	7.0	1.2	340.0	3.0	0.0	Vert	PK	0.0	49.0	74.0	-25.0	High Channel 903.7 MHz, spreading factor 10, EUT Vert
3615.165	41.5	7.0	1.0	130.0	3.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	High Channel 903.7 MHz, spreading factor 10, EUT Horz
3615.035	41.5	7.0	1.2	343.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	High Channel 903.7 MHz, spreading factor 7, EUT Vert
3614.760	41.5	7.0	1.0	41.0	3.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	High Channel 903.7 MHz, spreading factor 7, EUT Vert
3614.715	41.5	7.0	1.0	32.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	High Channel 903.7 MHz, spreading factor 10, EUT on side
3614.840	41.4	7.0	1.0	43.0	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	High Channel 903.7 MHz, spreading factor 10, EUT Vert
3614.685	41.2	7.0	1.0	306.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	High Channel 903.7 MHz, spreading factor 10, EUT Horz
3609.183	40.6	7.0	1.0	44.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
4517.945	38.8	8.8	1.0	166.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	High Channel 903.7 MHz, spreading factor 7, EUT Vert
4514.008	37.7	8.8	3.5	318.0	3.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert
2710.800	41.8	0.0	1.0	175.0	3.0	0.0	Horz	PK	0.0	41.8	74.0	-32.2	High Channel 903.7 MHz, spreading factor 7, EUT Vert
2707.142	41.4	0.0	1.0	4.0	3.0	0.0	Horz	PK	0.0	41.4	74.0	-32.6	Low Channel 902.3 Mhz, spreading factor 7, EUT Vert

DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The test software provided for operation in a fixed, single channel mode allows the EUT to operate continuously at 100% Duty Cycle.

CARRIER FREQUENCY SEPARATION

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The carrier frequency separation was measured between each of 8 hopping channels in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

CARRIER FREQUENCY SEPARATION

NORTHWEST EMC

XMit 2015.01.14

EUT:	**FAIRWAYiQ Smart Tag, Model FIQ-01**			**Work Order:**	**RIGA0008**
Serial Number:	**7373**			**Date:**	**05/22/16**
Customer:	**FAIRWAYiQ**			**Temperature:**	**21.8°C**
Attendees:	**Mark Bielman**			**Humidity:**	**44%**
Project:	**None**			**Barometric Pres.:**	**1014 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5VDC via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Modulation modes provided by the client.

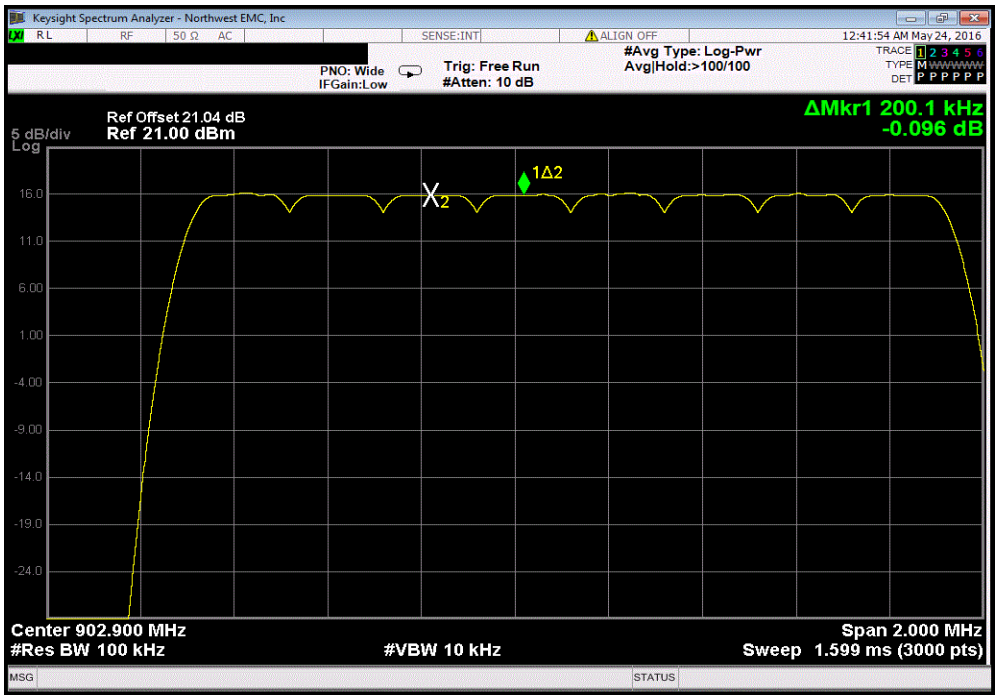
DEVIATIONS FROM TEST STANDARD

None

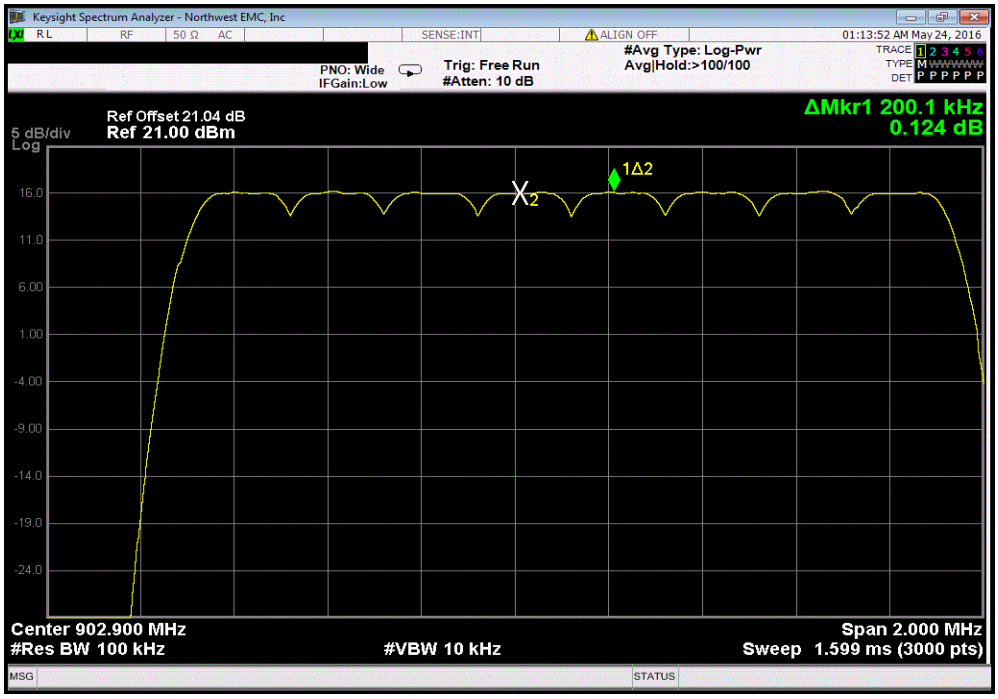
Configuration #	**4**	*Signature*

		Value	**Limit (≥)**	**Results**
Hopping Mode				
	980bps (Spreading Factor 10) OBW 125KHz			
	Mid Channel, 902.9 MHz	200.1 kHz	135 kHz	Pass
	5470bps (Spreading Factor 7) OBW 125KHz			
	Mid Channel, 902.9 MHz	200.1 kHz	135 kHz	Pass

Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Mid Channel, 902.9 MHz						
				Value	Limit (≥)	Results
				200.1 kHz	135 kHz	Pass



Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Mid Channel, 902.9 MHz						
				Value	Limit (≥)	Results
				200.1 kHz	135 kHz	Pass



DWELL TIME

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels * 400 mS. For this hybrid radio that would be 8 Channels * 400mS = 3.2 Sec.

On Time During 3.2 Sec = Pulse Width * Average Number of Pulses * Scale Factor

Average Number of Pulses is based on 4 samples.

Scale Factor = 3.2 Sec / Screen Capture Sweep Time = 3.2 Sec / 3.2 Sec = 1

DWELL TIME

NORTHWEST EMC

XMit 2015.01.14

EUT:	**FAIRWAYiQ Smart Tag, Model FIQ-01**			**Work Order:**	**RIGA0008**
Serial Number:	**7373**			**Date:**	**05/22/16**
Customer:	**FAIRWAYiQ**			**Temperature:**	**21.8°C**
Attendees:	**Mark Bielman**			**Humidity:**	**44%**
Project:	**None**			**Barometric Pres.:**	**1014 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5VDC via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Modulation modes provided by the client.

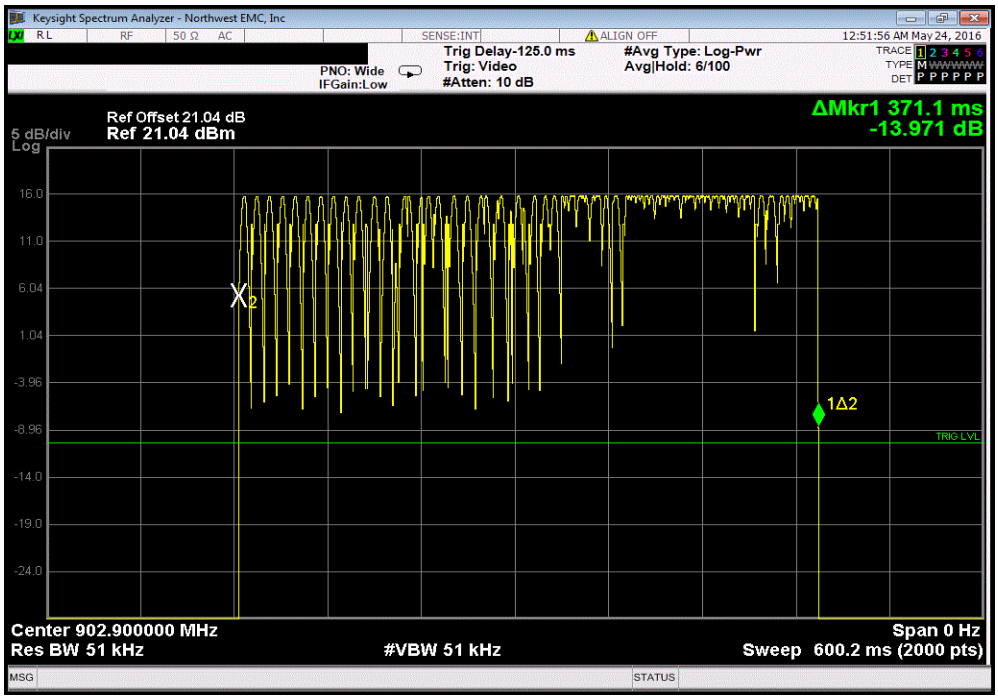
DEVIATIONS FROM TEST STANDARD

None

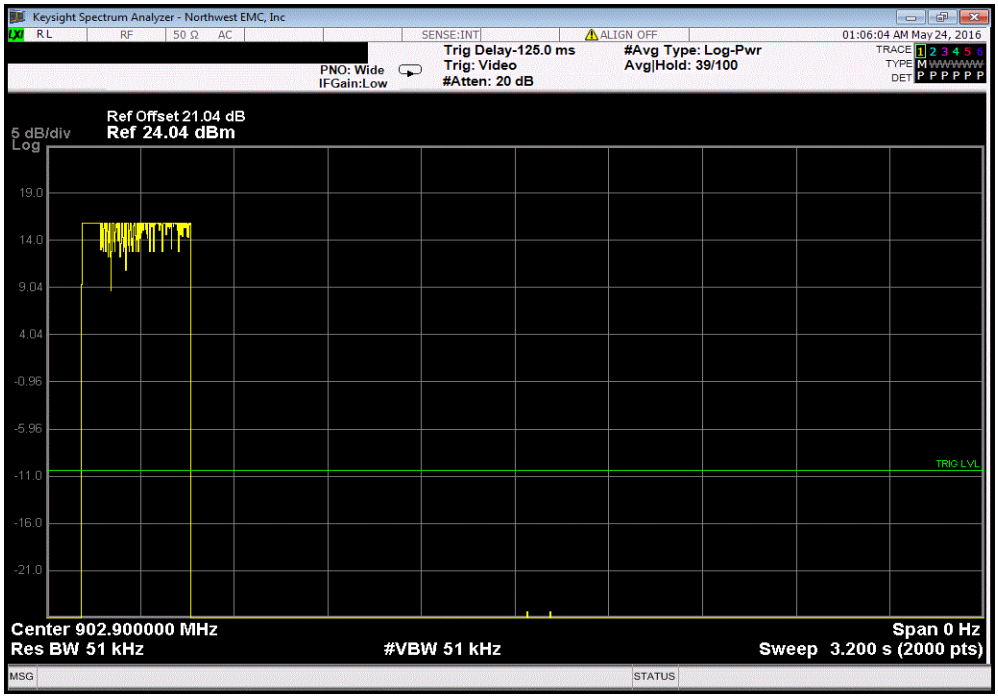
Configuration #	**4**	*Signature*

	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
Hopping Mode						
Mid Channel 902.9 MHz						
980bps (Spreading Factor 10) OBW 125KHz						
Pulse Width	N/A	371.1 ms	N/A	N/A	N/A	N/A
Sample 1	N/A	N/A	1	N/A	N/A	N/A
Sample 2	N/A	N/A	1	N/A	N/A	N/A
Sample 3	N/A	N/A	1	N/A	N/A	N/A
Sample 4	1	371.1 ms	1	371.1 ms	400 ms	Pass
5470bps (Spreading Factor 7) OBW 125KHz						
Pulse Width	N/A	61.83 ms	N/A	N/A	N/A	N/A
Sample 1	N/A	N/A	1	N/A	N/A	N/A
Sample 2	N/A	N/A	1	N/A	N/A	N/A
Sample 3	N/A	N/A	1	N/A	N/A	N/A
Sample 4	1	61.83 ms	1	61.83 ms	400 ms	Pass

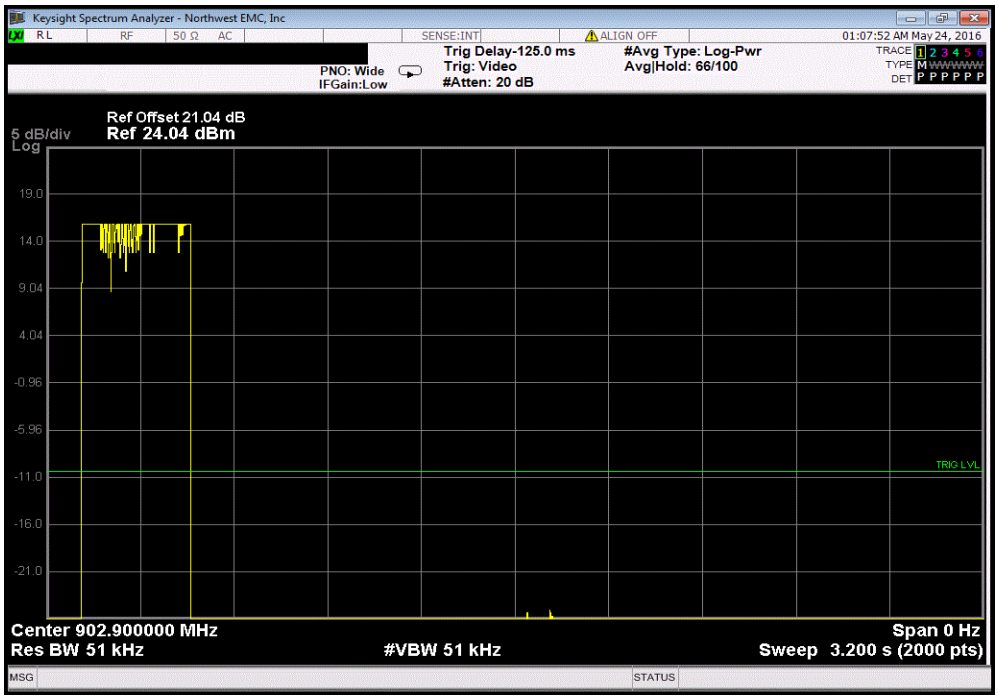
Hopping Mode, Mid Channel 902.9 MHz, 980bps (Spreading Factor 10) OBW 125KHz, Pulse Width						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	371.1 ms	N/A	N/A	N/A	N/A



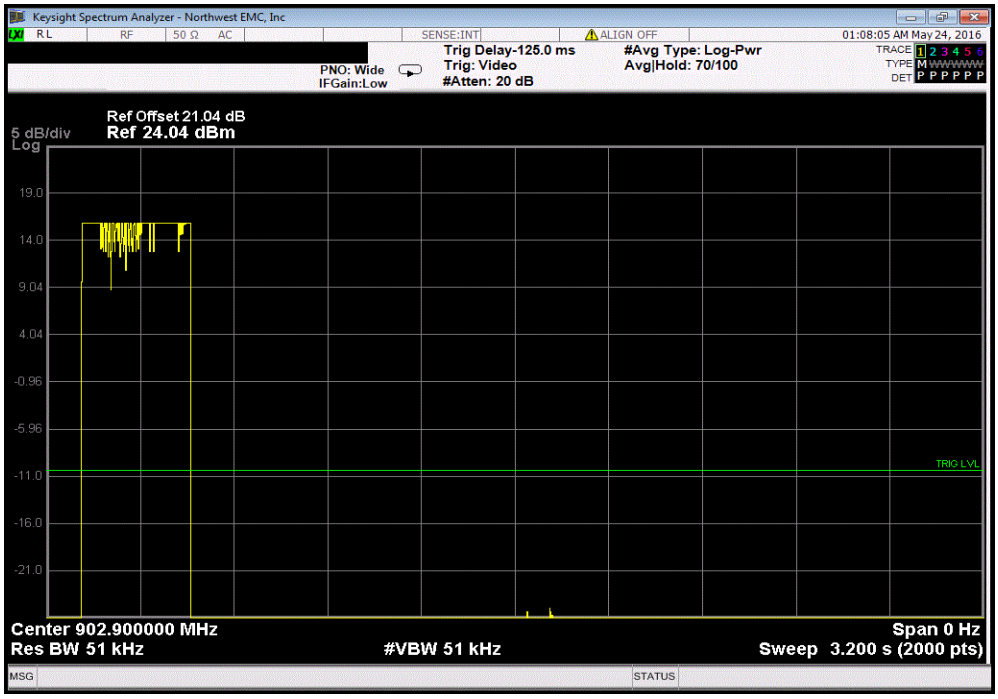
Hopping Mode, Mid Channel 902.9 MHz, 980bps (Spreading Factor 10) OBW 125KHz, Sample 1						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



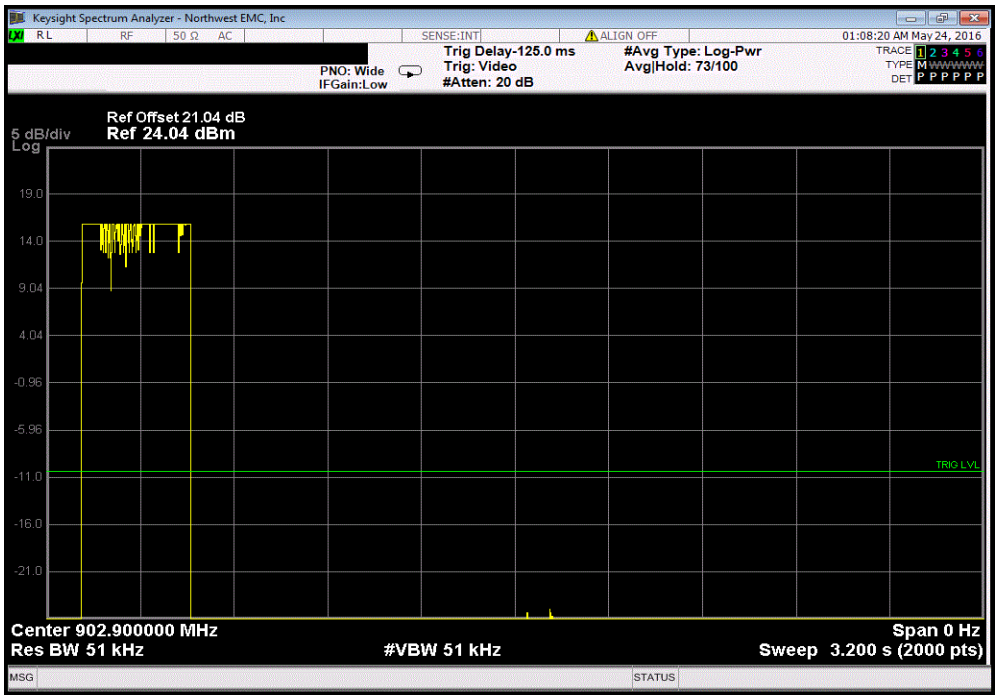
Hopping Mode, Mid Channel 902.9 MHz, 980bps (Spreading Factor 10) OBW 125KHz, Sample 2						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



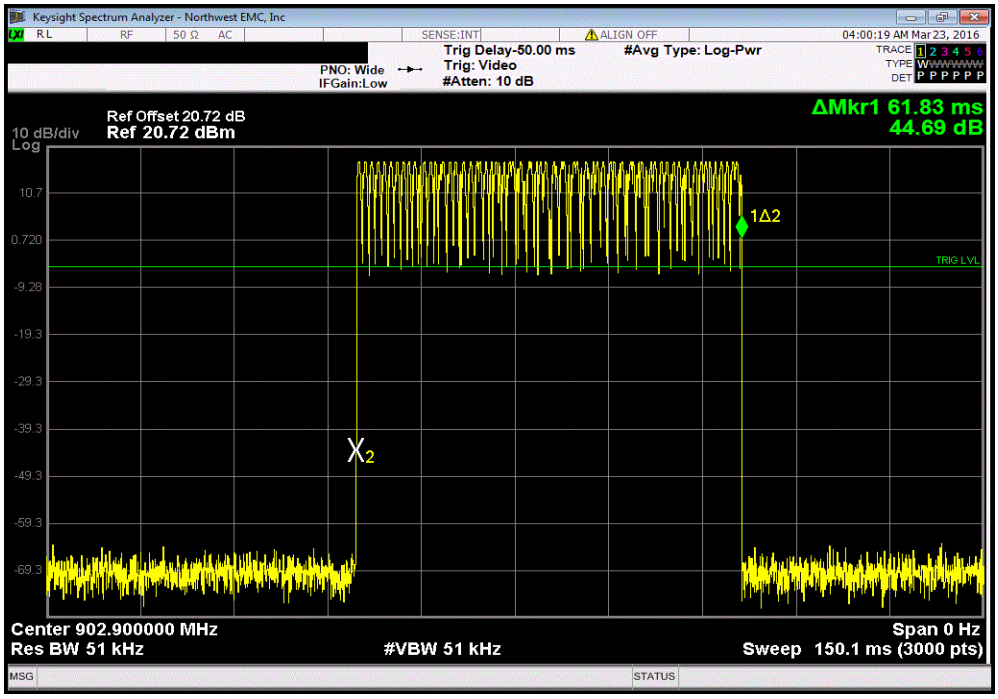
Hopping Mode, Mid Channel 902.9 MHz, 980bps (Spreading Factor 10) OBW 125KHz, Sample 3						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



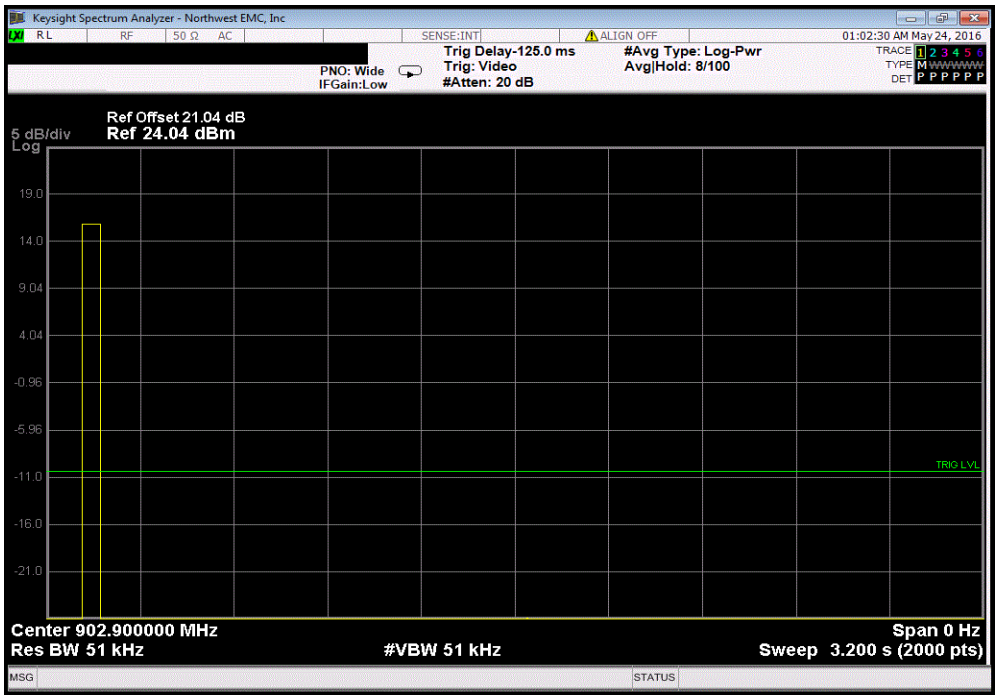
Hopping Mode, Mid Channel 902.9 MHz, 980bps (Spreading Factor 10) OBW 125KHz, Sample 4						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	1	371.1 ms	1	371.1 ms	400 ms	Pass



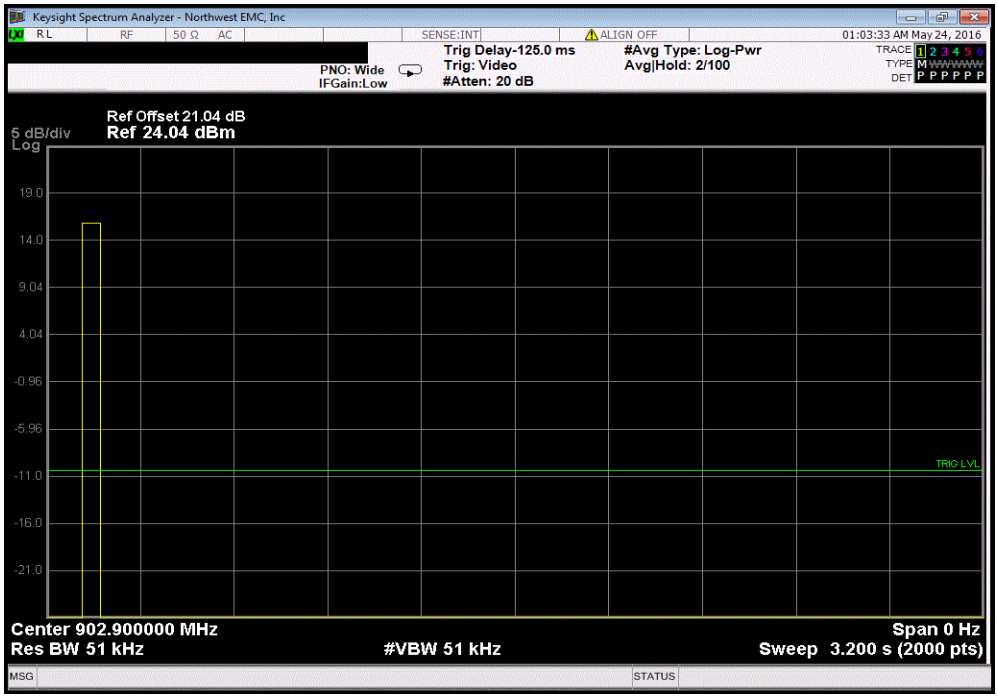
Hopping Mode, Mid Channel 902.9 MHz, 5470bps (Spreading Factor 7) OBW 125KHz, Pulse Width						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	61.83 ms	N/A	N/A	N/A	N/A



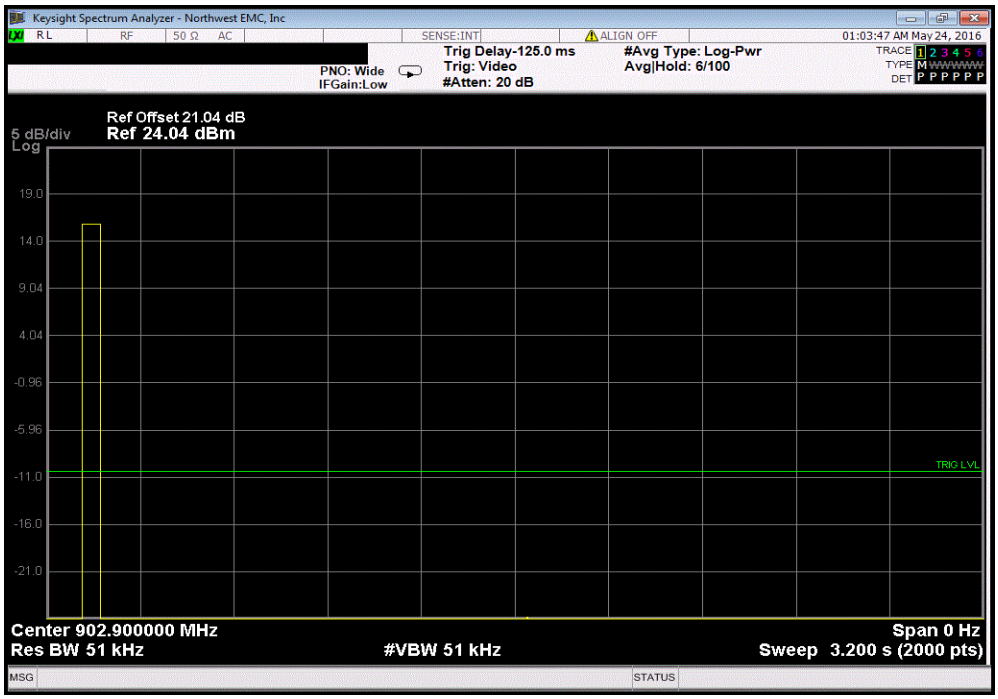
Hopping Mode, Mid Channel 902.9 MHz, 5470bps (Spreading Factor 7) OBW 125KHz, Sample 1						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



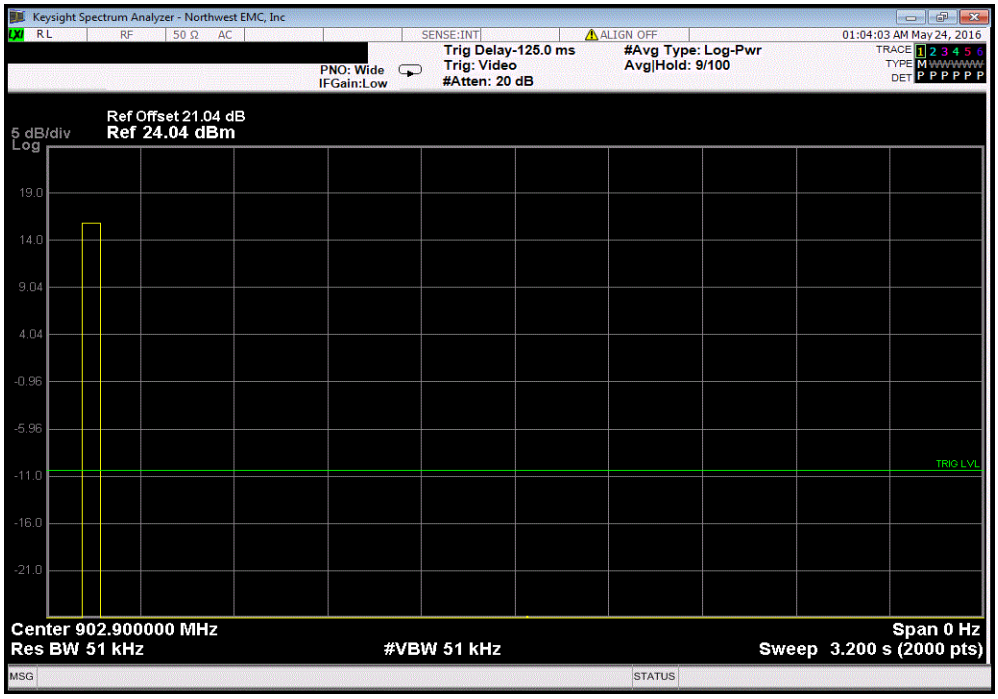
Hopping Mode, Mid Channel 902.9 MHz, 5470bps (Spreading Factor 7) OBW 125KHz, Sample 2						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



Hopping Mode, Mid Channel 902.9 MHz, 5470bps (Spreading Factor 7) OBW 125KHz, Sample 3						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	N/A	N/A	1	N/A	N/A	N/A



Hopping Mode, Mid Channel 902.9 MHz, 5470bps (Spreading Factor 7) OBW 125KHz, Sample 4						
	Scaling Factor	Pulse Width	Avg # of Pulses	Value	Limit	Result
	1	61.83 ms	1	61.83 ms	400 ms	Pass



OUTPUT POWER

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring peak transmit power the DTS bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method found in ANSI C63.10:2013 Section 11.9.2.2.2 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio and the duty cycle was measured to be greater then 98.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

NORTHWEST EMC

XMit 2015.01.14

EUT:	**FAIRWAYiQ Smart Tag, Model FIQ-01**			**Work Order:**	**RIGA0008**
Serial Number:	**7371**			**Date:**	**05/23/16**
Customer:	**FAIRWAYiQ**			**Temperature:**	**21.8°C**
Attendees:	**Mark Bielman**			**Humidity:**	**44%**
Project:	**None**			**Barometric Pres.:**	**1014 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5VDC via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

The EUT was operating at 100% duty cycle while under test.

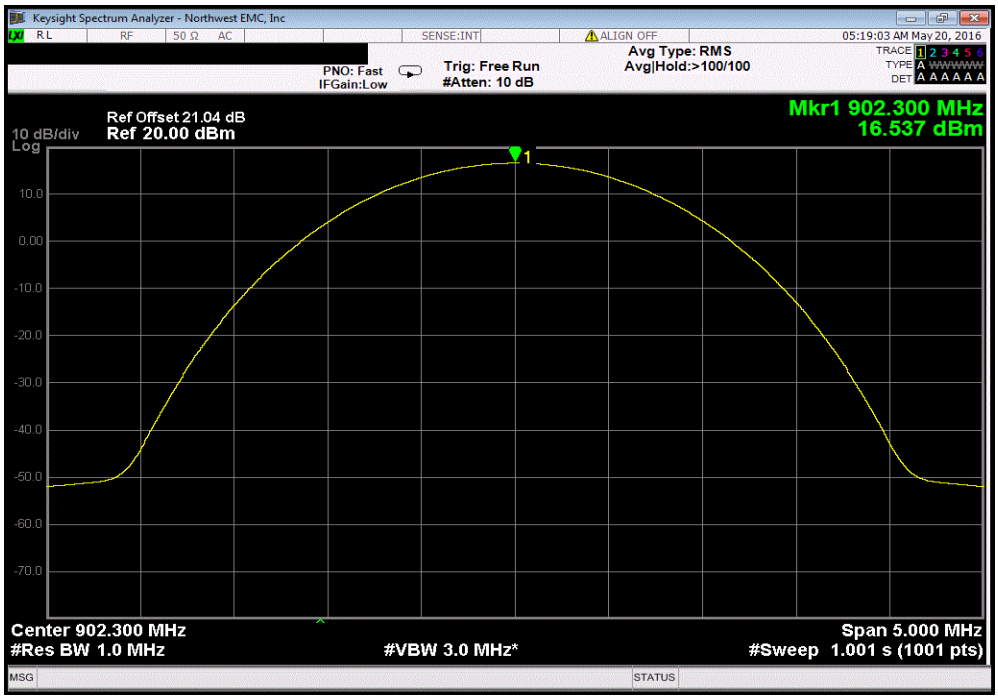
DEVIATIONS FROM TEST STANDARD

None

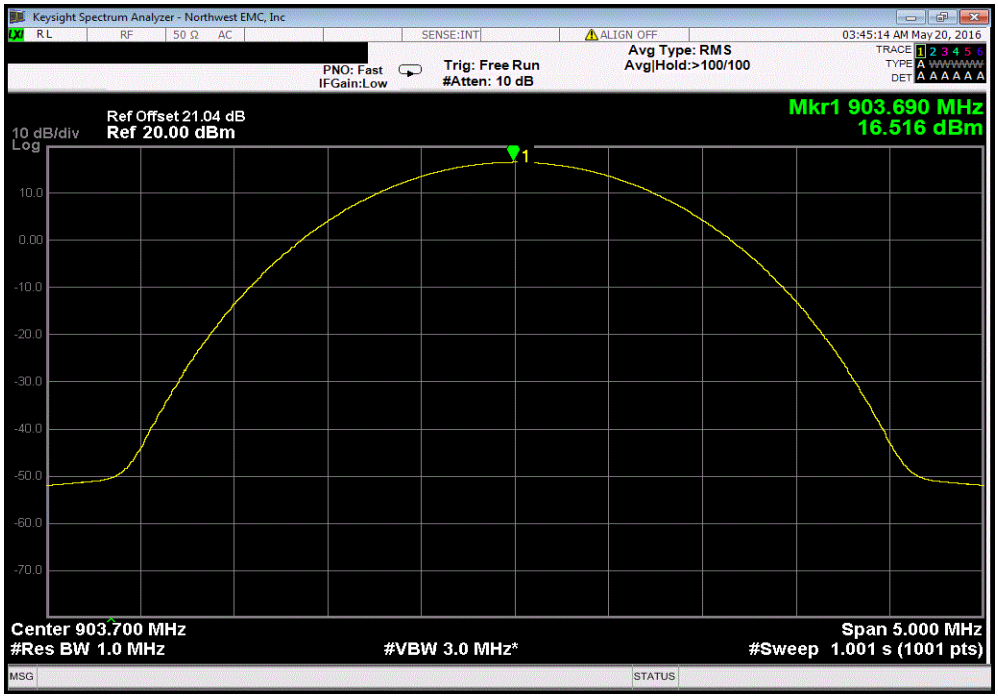
Configuration #	**3**	*Signature*

		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results
Non Hopping Mode						
	980bps (Spreading Factor 10) OBW 125KHz					
	Low Channel, 902.3 MHz	16.537	0	16.5	30	Pass
	High Channel, 903.7 MHz	16.516	0	16.5	30	Pass
	5470bps (Spreading Factor 7) OBW 125KHz					
	Low Channel, 902.3 MHz	16.538	0	16.5	30	Pass
	High Channel, 903.7 MHz	16.517	0	16.5	30	Pass

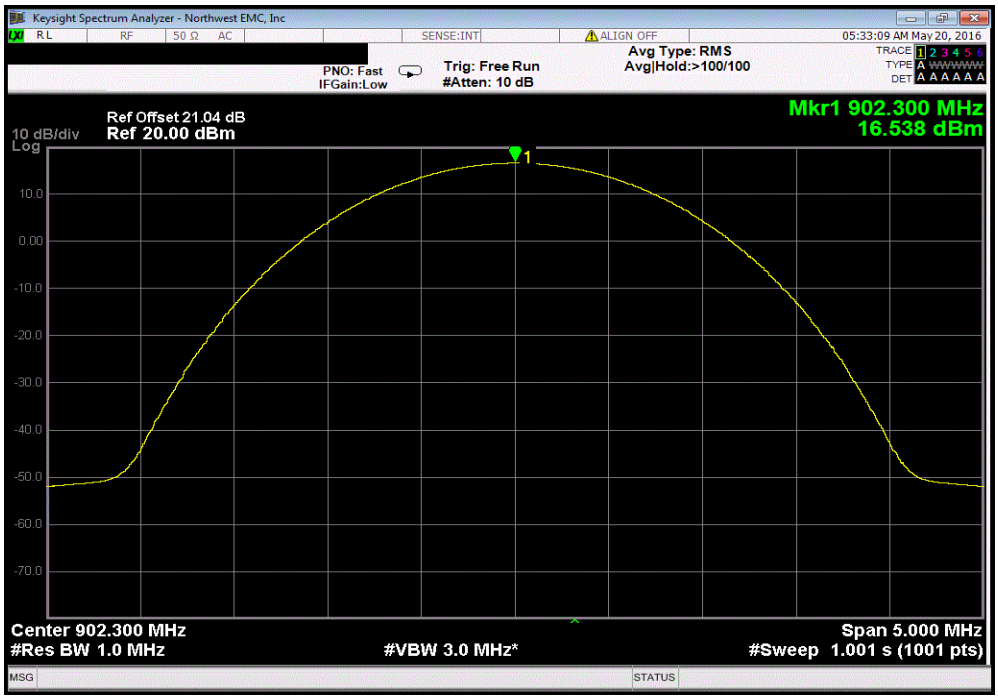
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	16.537	0		16.5	30	Pass



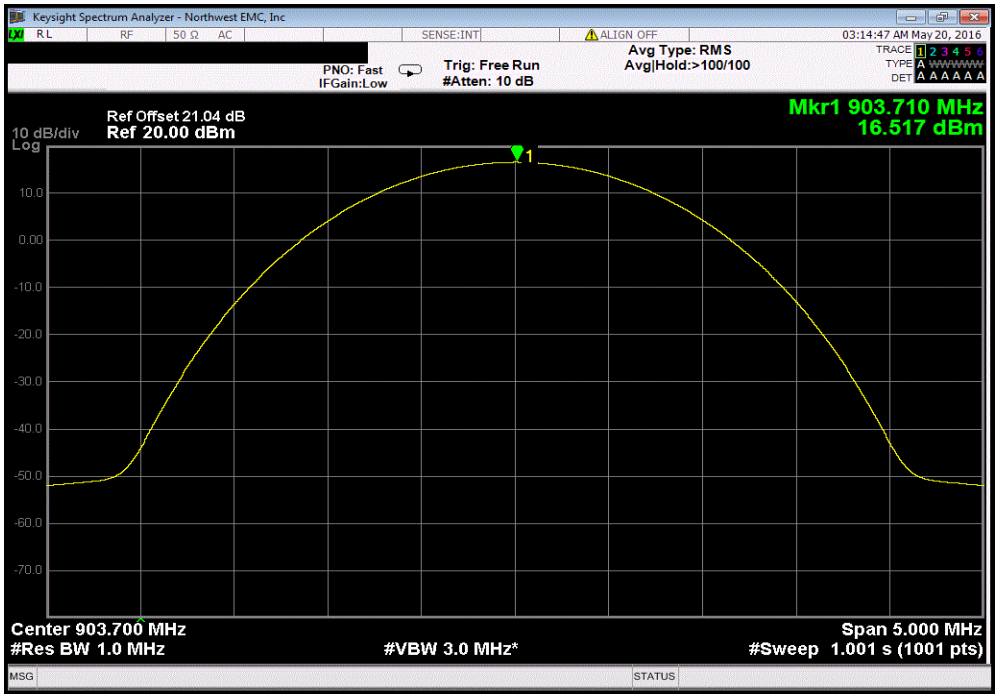
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	16.516	0		16.5	30	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	16.538	0		16.5	30	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)		Value (dBm)	Limit (dBm)	Results
	16.517	0		16.5	30	Pass



BAND EDGE COMPLIANCE

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	36
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	0
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

NORTHWEST EMC

XMit 2015.01.14

EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01			**Work Order:**	RIGA0008
Serial Number:	7371			**Date:**	06/02/16
Customer:	FAIRWAYiQ			**Temperature:**	21.8°C
Attendees:	Mark Bielman			**Humidity:**	44%
Project:	None			**Barometric Pres.:**	1014 mbar
Tested by:	Brandon Hobbs	**Power:**	5VDC via 110VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

The EUT was operating at 100% duty cycle while under test.

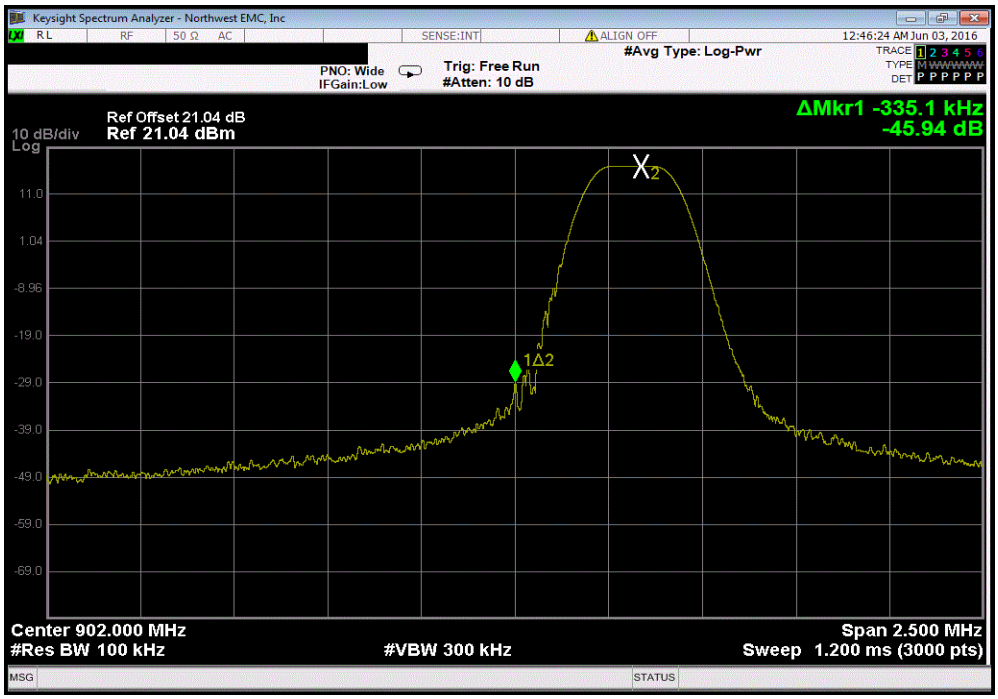
DEVIATIONS FROM TEST STANDARD

None

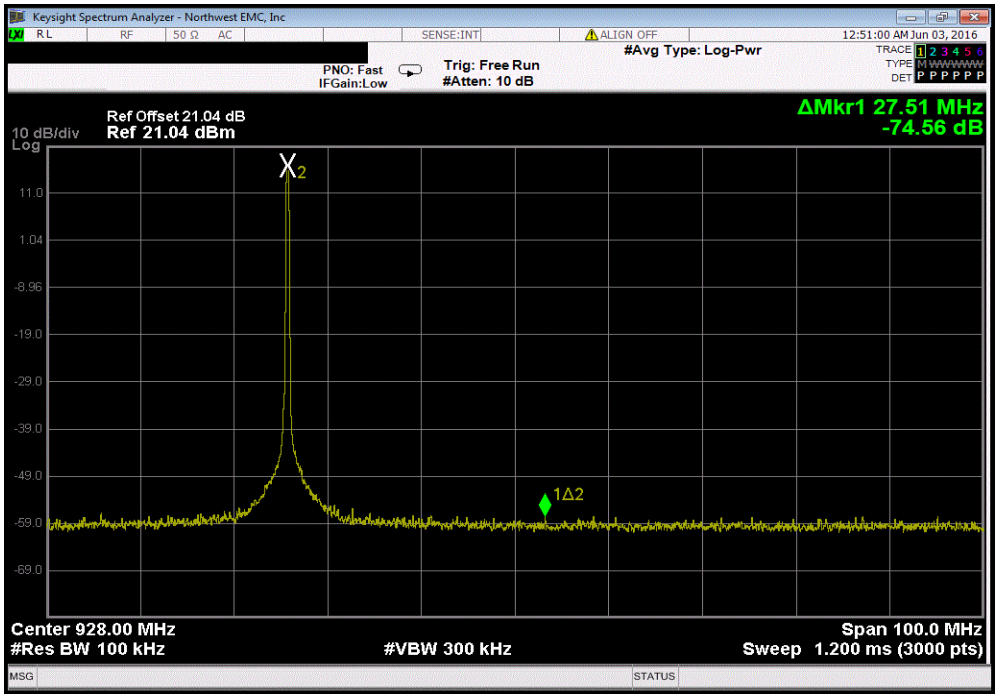
Configuration #	3	Signature

	Value (dBc)	Limit ≤ (dBc)	Result
Non Hopping Mode			
980bps (Spreading Factor 10) OBW 125KHz			
Low Channel, 902.3 MHz	-45.94	-30	Pass
High Channel, 903.7 MHz	-74.56	-30	Pass
5470bps (Spreading Factor 7) OBW 125KHz			
Low Channel, 902.3 MHz	-51.28	-30	Pass
High Channel, 903.7 MHz	-74.3	-30	Pass

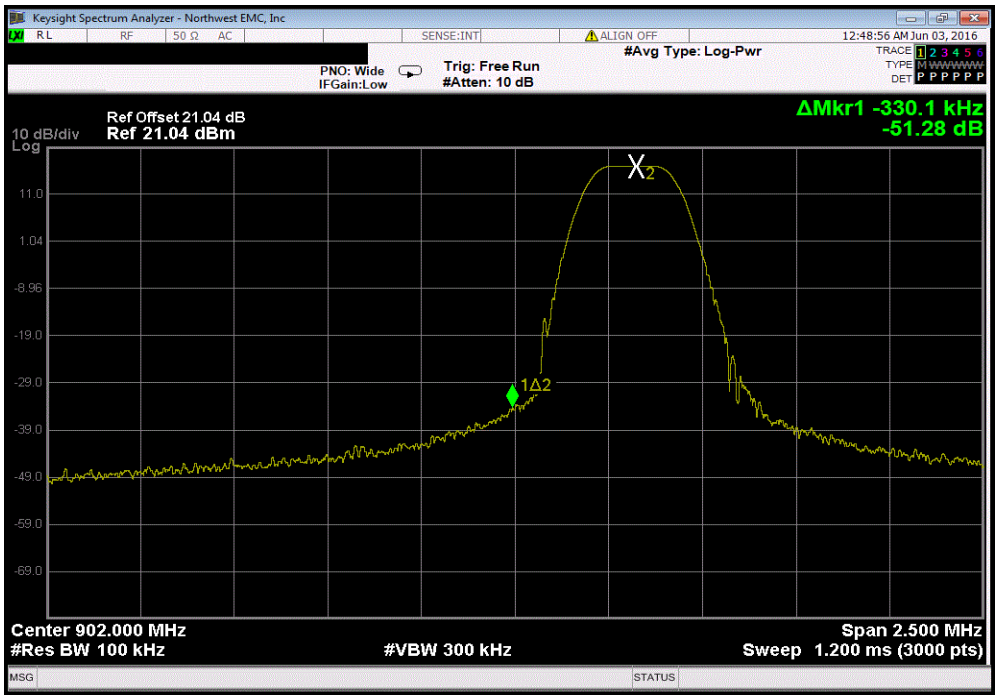
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.94	-30	Pass



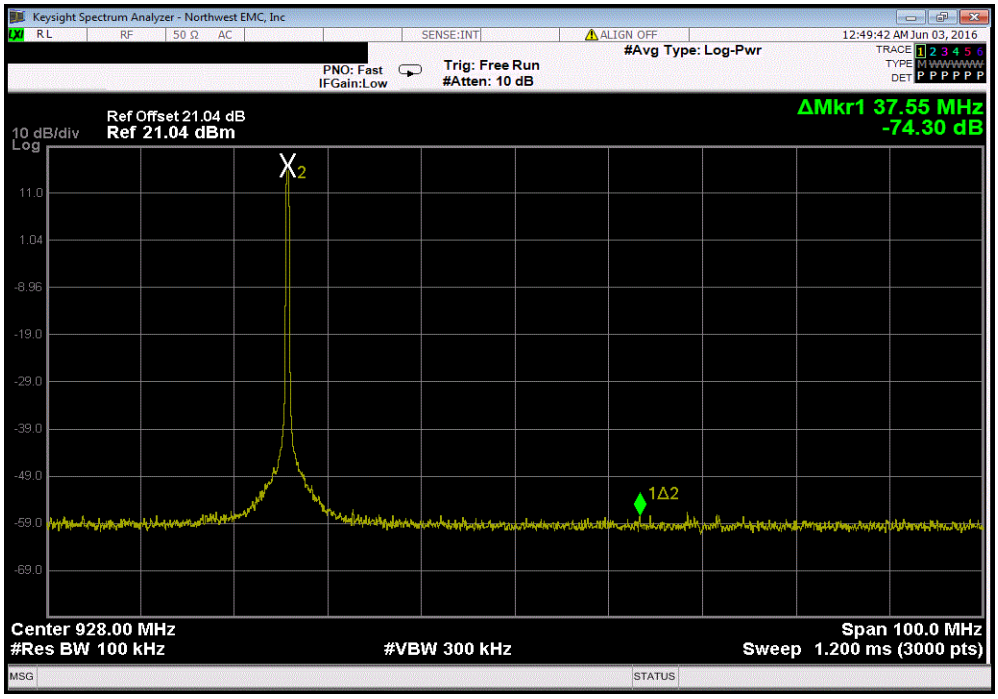
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-74.56	-30	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.28	-30	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-74.3	-30	Pass



BAND EDGE COMPLIANCE - HOPPING MODE

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	36
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE - HOPPING MODE

NORTHWEST EMC

XMit 2015.01.14

EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01			**Work Order:**	RIGA0008
Serial Number:	7373			**Date:**	06/02/16
Customer:	FAIRWAYiQ			**Temperature:**	21.8°C
Attendees:	Mark Bielman			**Humidity:**	44%
Project:	None			**Barometric Pres.:**	1014 mbar
Tested by:	Brandon Hobbs	**Power:**	5VDC via 110VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Modulation modes provided by the client.

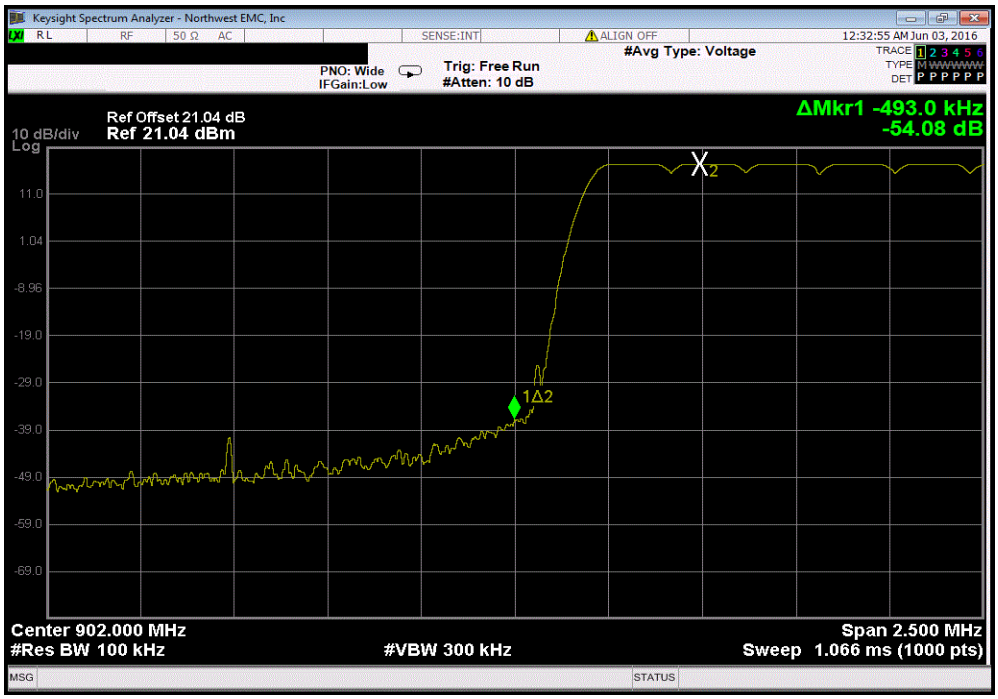
DEVIATIONS FROM TEST STANDARD

None

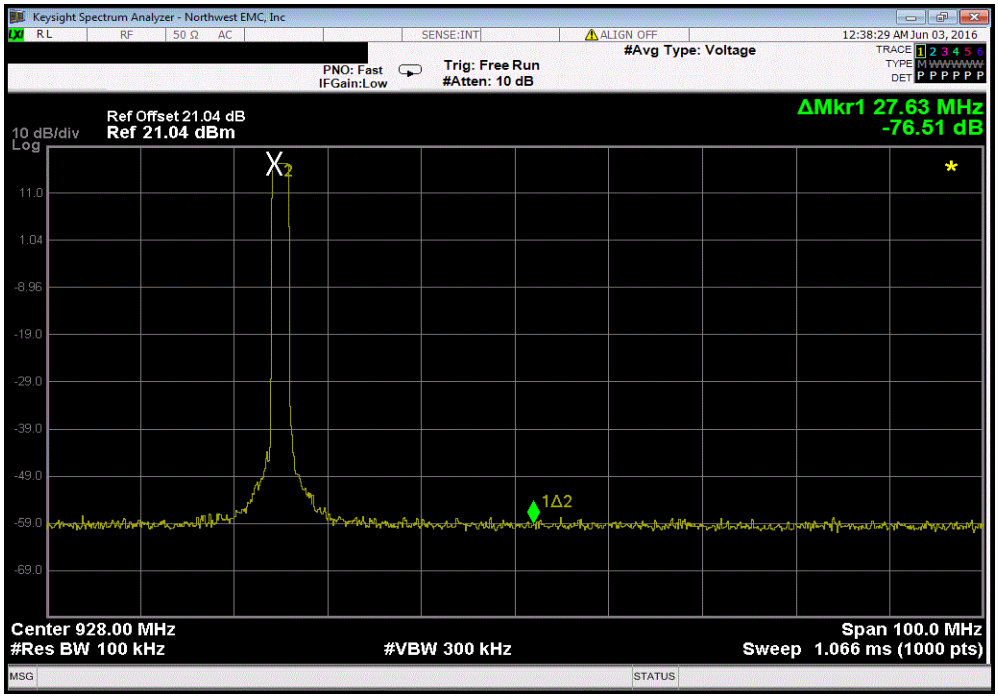
Configuration #	4	Signature

		Value (dBc)	Limit ≤ (dBc)	Result
Hopping Mode				
	980bps (Spreading Factor 10) OBW 125KHz			
	Low Channel, 902.3 MHz	-54.08	-30	Pass
	High Channel, 903.7 MHz	-76.51	-30	Pass
	5470bps (Spreading Factor 7) OBW 125KHz			
	Low Channel, 902.3 MHz	-52.39	-30	Pass
	High Channel, 903.7 MHz	-73.95	-30	Pass

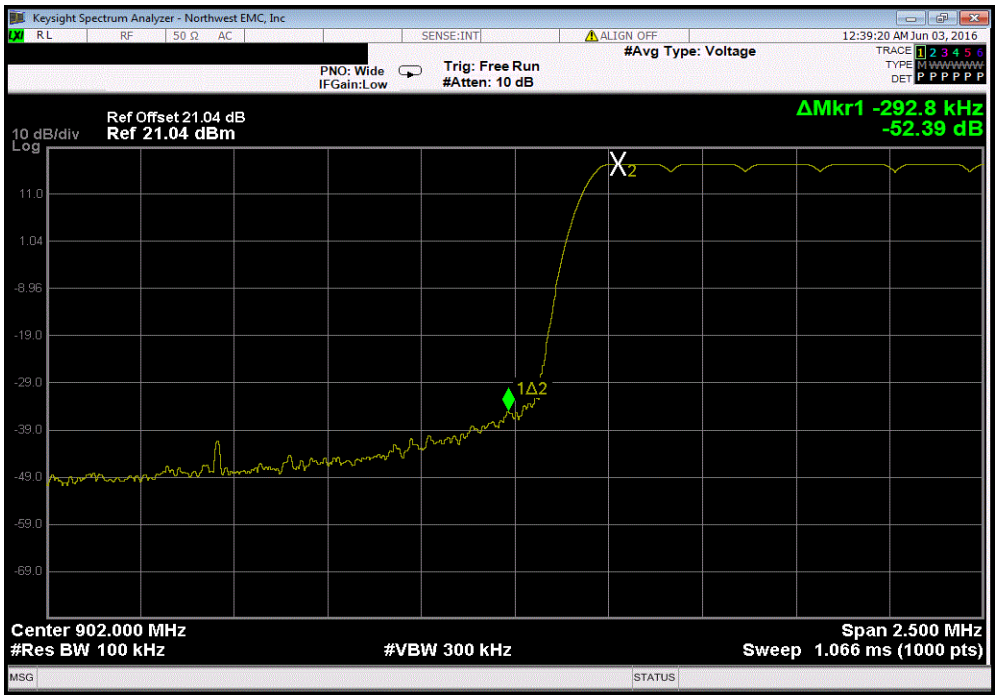
Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.08	-30	Pass



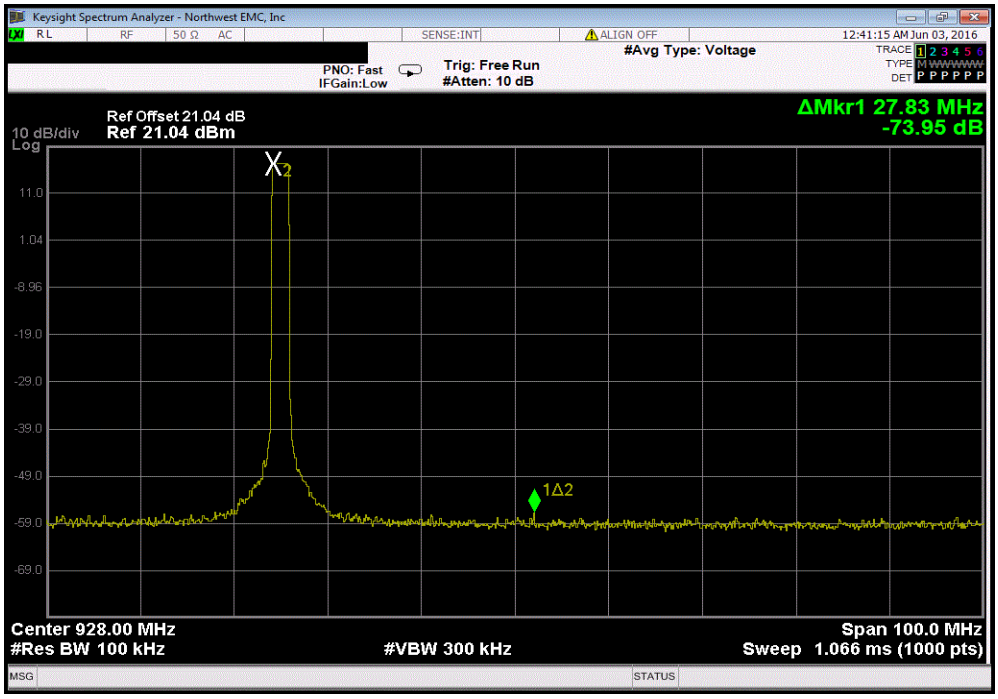
Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-76.51	-30	Pass



Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.39	-30	Pass



Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-73.95	-30	Pass



OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The 20 dB occupied bandwidth was measured with the EUT set to low and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	**FAIRWAYiQ Smart Tag, Model FIQ-01**			**Work Order:**	**RIGA0008**
Serial Number:	**7371**			**Date:**	**05/23/16**
Customer:	**FAIRWAYiQ**			**Temperature:**	**21.8°C**
Attendees:	**Mark Bielman**			**Humidity:**	**44%**
Project:	**None**			**Barometric Pres.:**	**1014 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5VDC via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

The EUT was operating at 100% duty cycle while under test.

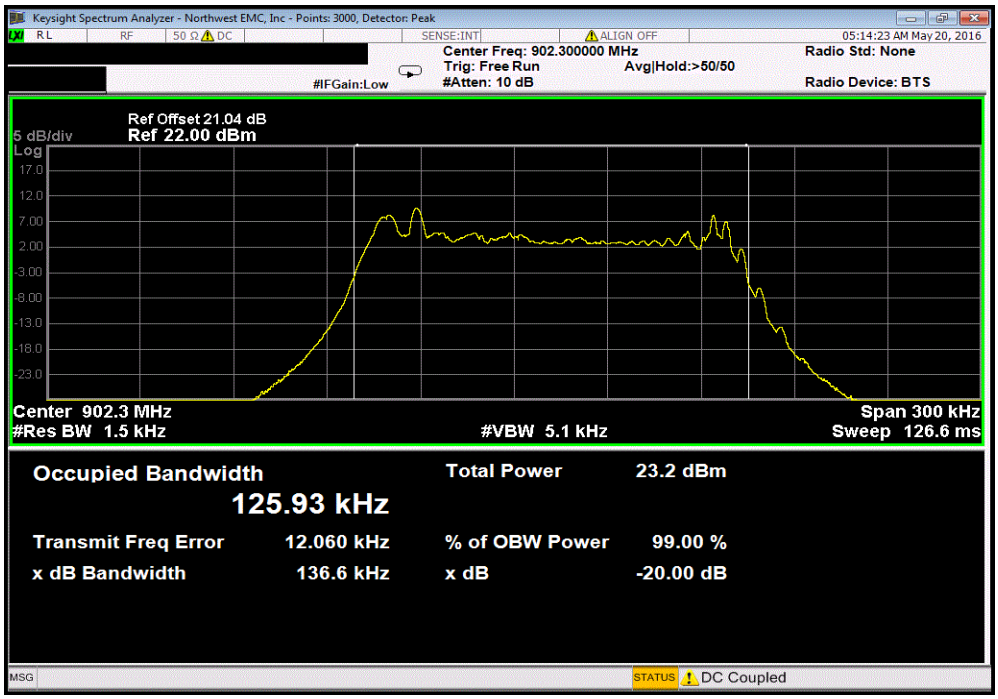
DEVIATIONS FROM TEST STANDARD

None

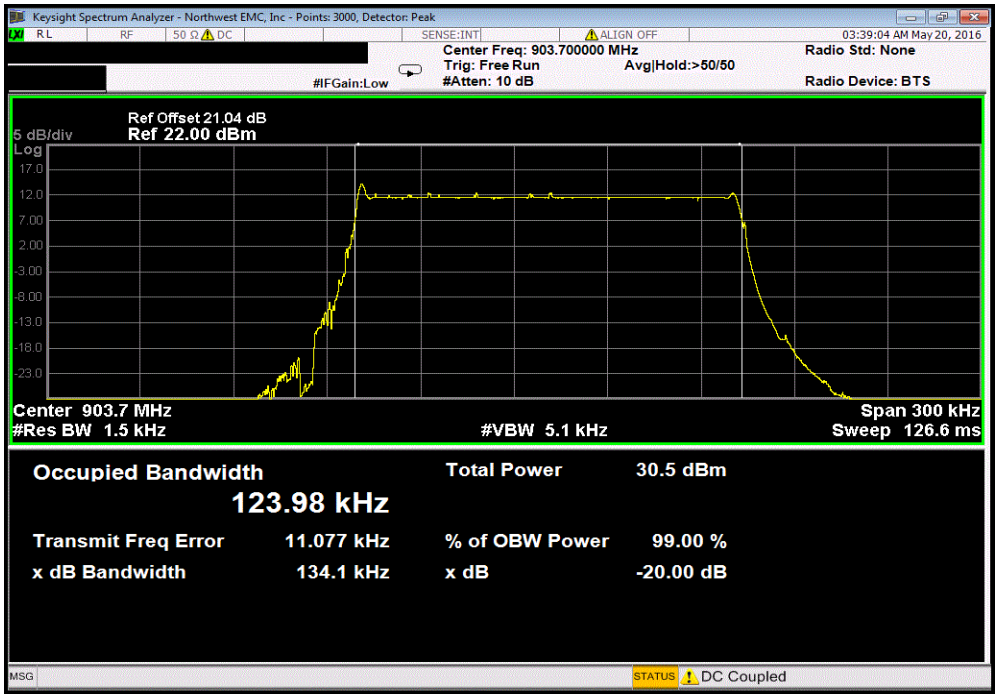
Configuration #	**3**	*Signature*

		Value	**Limit (>)**	**Result**
Non Hopping Mode				
	980bps (Spreading Factor 10) OBW 125KHz			
	Low Channel, 902.3 MHz	136.589 kHz	N/A	N/A
	High Channel, 903.7 MHz	134.1 kHz	N/A	N/A
	5470bps (Spreading Factor 7) OBW 125KHz			
	Low Channel, 902.3 MHz	134.412 kHz	N/A	N/A
	High Channel, 903.7 MHz	136.583 kHz	N/A	N/A

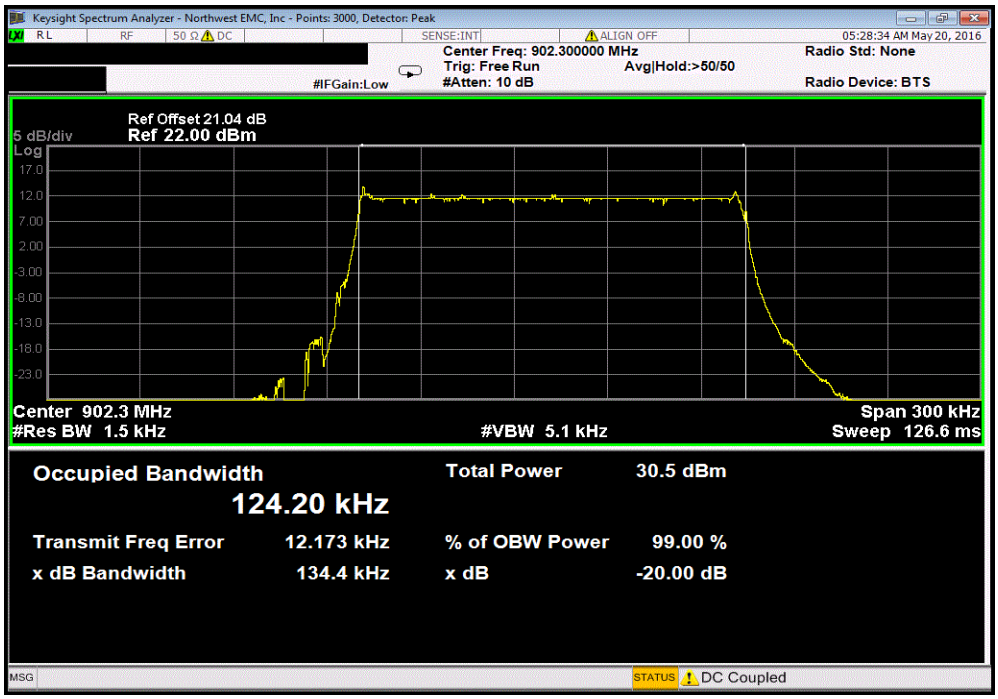
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
				Value	Limit (>)	Result
				136.589 kHz	N/A	N/A



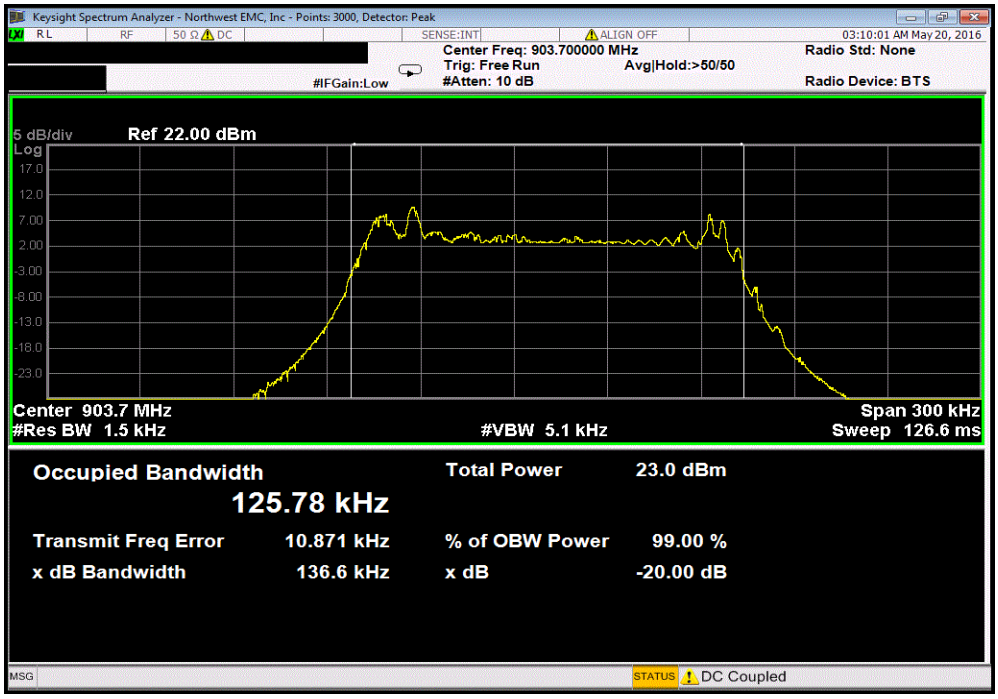
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
				Value	Limit (>)	Result
				134.1 kHz	N/A	N/A



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
				Value	Limit (>)	Result
				134.412 kHz	N/A	N/A



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
				Value	Limit (>)	Result
				136.583 kHz	N/A	N/A



SPURIOUS CONDUCTED EMISSIONS

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

NORTHWEST EMC

XMit 2015.01.14

EUT:	FAIRWAYiQ Smart Tag, Model FIQ-01			**Work Order:**	RIGA0008
Serial Number:	7371			**Date:**	05/23/16
Customer:	FAIRWAYiQ			**Temperature:**	21.8°C
Attendees:	Mark Bielman			**Humidity:**	44%
Project:	None			**Barometric Pres.:**	1014 mbar
Tested by:	Brandon Hobbs	**Power:**	5VDC via 110VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

The EUT was operating at 100% duty cycle while under test.

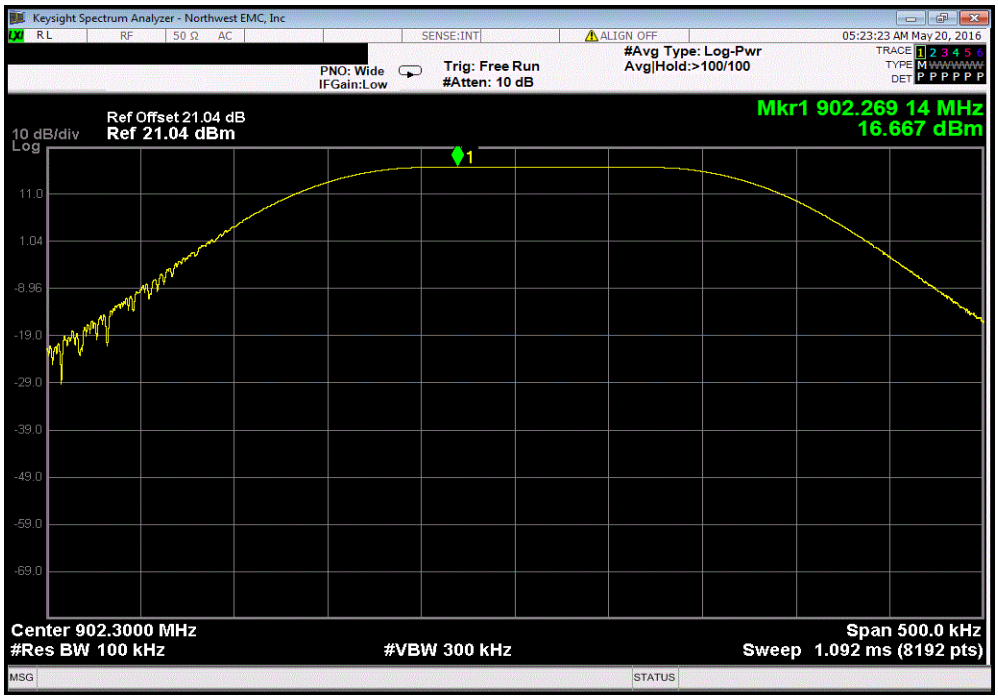
DEVIATIONS FROM TEST STANDARD

None

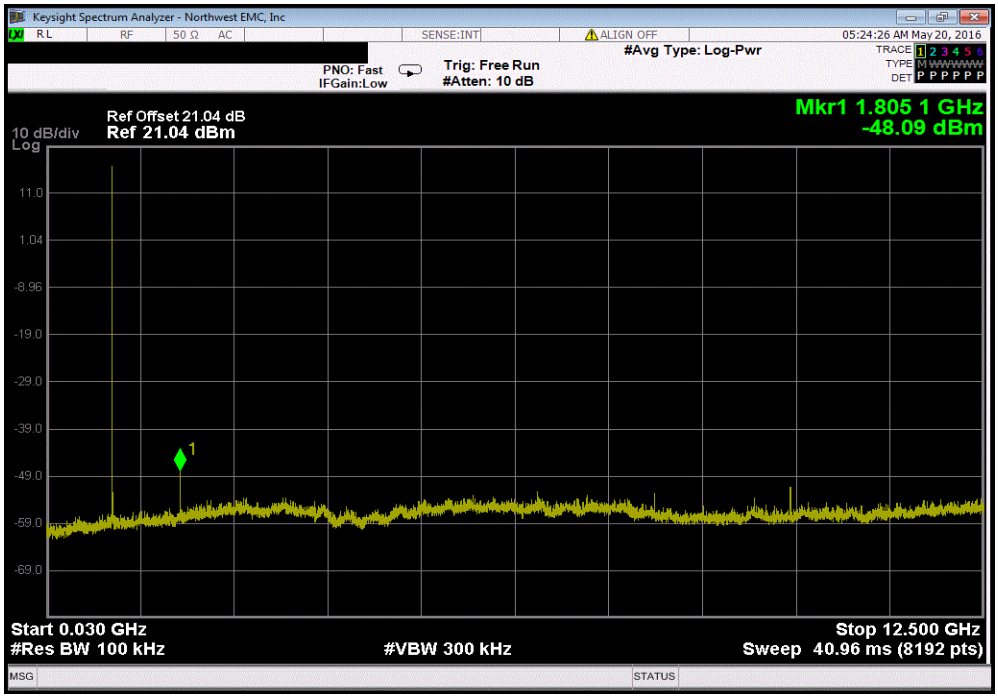
Configuration #	3	Signature

		Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Non Hopping Mode					
	980bps (Spreading Factor 10) OBW 125KHz				
	Low Channel, 902.3 MHz	Fundamental	N/A	N/A	N/A
	Low Channel, 902.3 MHz	30 MHz - 12.5 GHz	-64.76	-30	Pass
	Low Channel, 902.3 MHz	12.5 GHz - 25 GHz	-55.34	-30	Pass
	High Channel, 903.7 MHz	Fundamental	N/A	N/A	N/A
	High Channel, 903.7 MHz	30 MHz - 12.5 GHz	-65.55	-30	Pass
	High Channel, 903.7 MHz	12.5 GHz - 25 GHz	-55.54	-30	Pass
	5470bps (Spreading Factor 7) OBW 125KHz				
	Low Channel, 902.3 MHz	Fundamental	N/A	N/A	N/A
	Low Channel, 902.3 MHz	30 MHz - 12.5 GHz	-64.86	-30	Pass
	Low Channel, 902.3 MHz	12.5 GHz - 25 GHz	-55.61	-30	Pass
	High Channel, 903.7 MHz	Fundamental	N/A	N/A	N/A
	High Channel, 903.7 MHz	30 MHz - 12.5 GHz	-64.93	-30	Pass
	High Channel, 903.7 MHz	12.5 GHz - 25 GHz	-55.81	-30	Pass

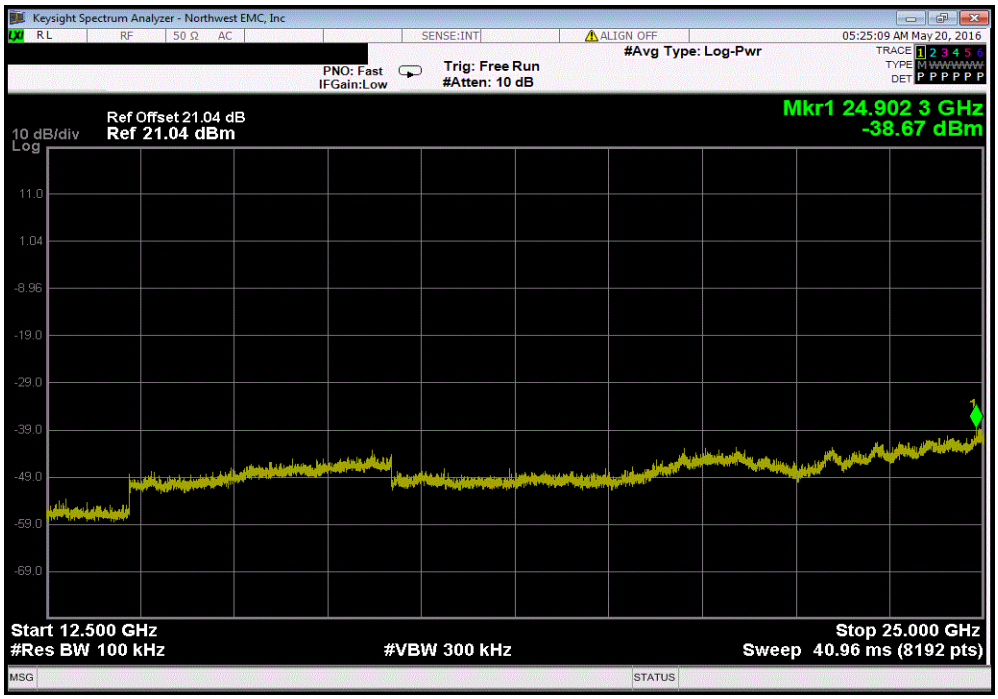
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



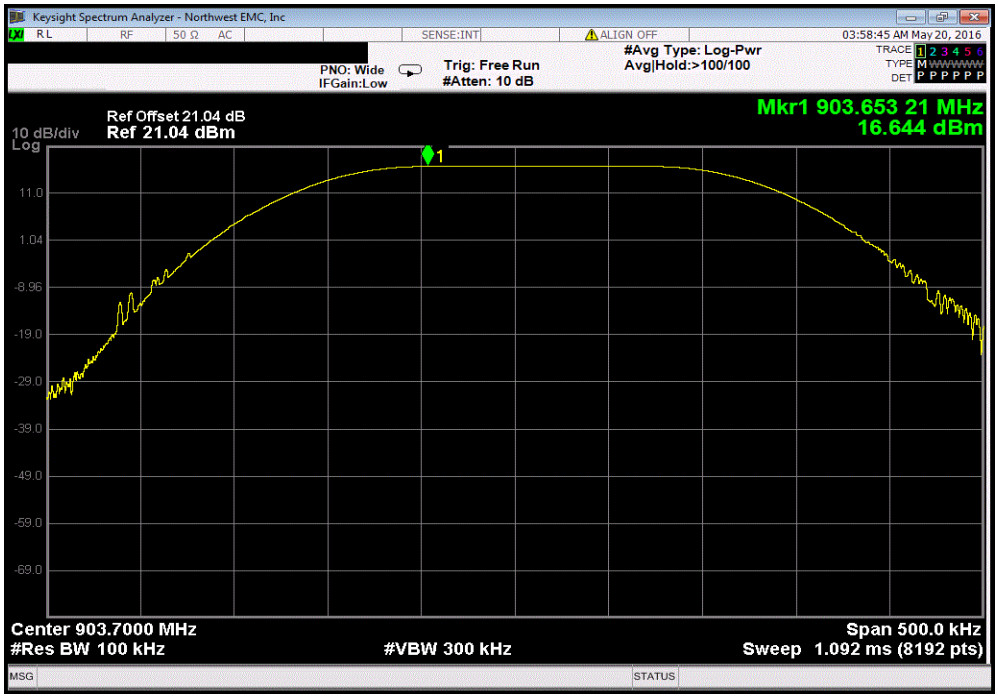
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-64.76	-30	Pass	



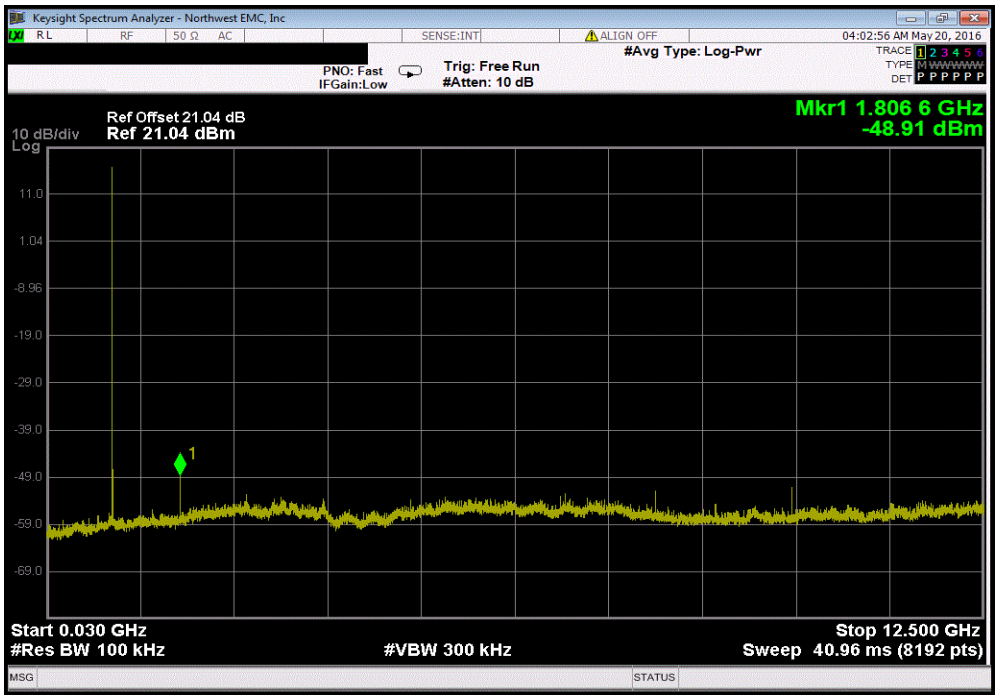
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-55.34	-30	Pass



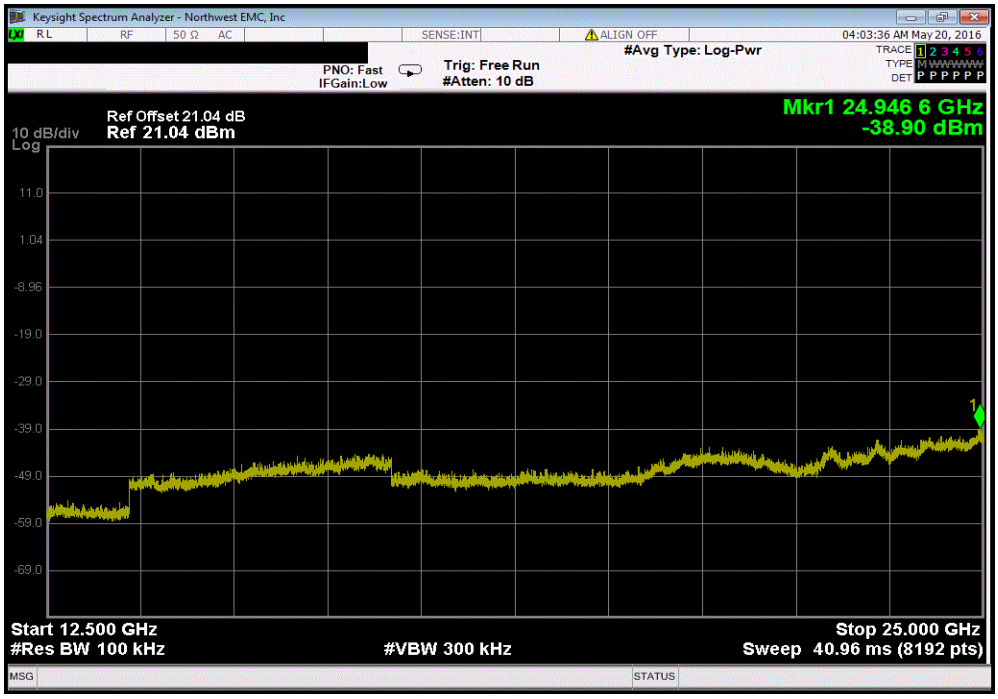
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
Frequency Range				Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



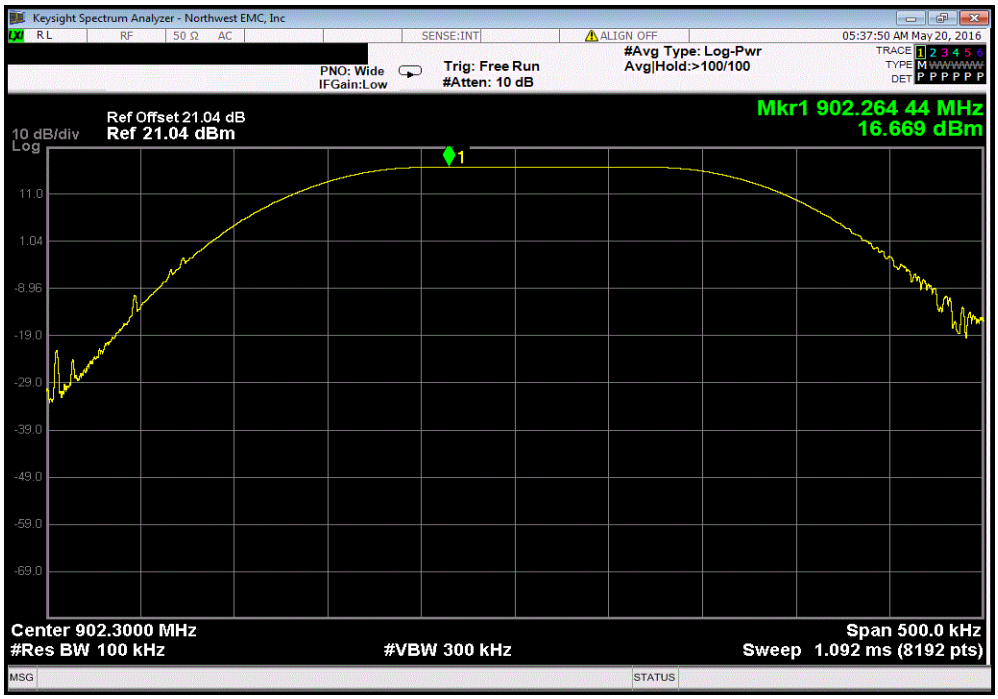
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-65.55	-30	Pass



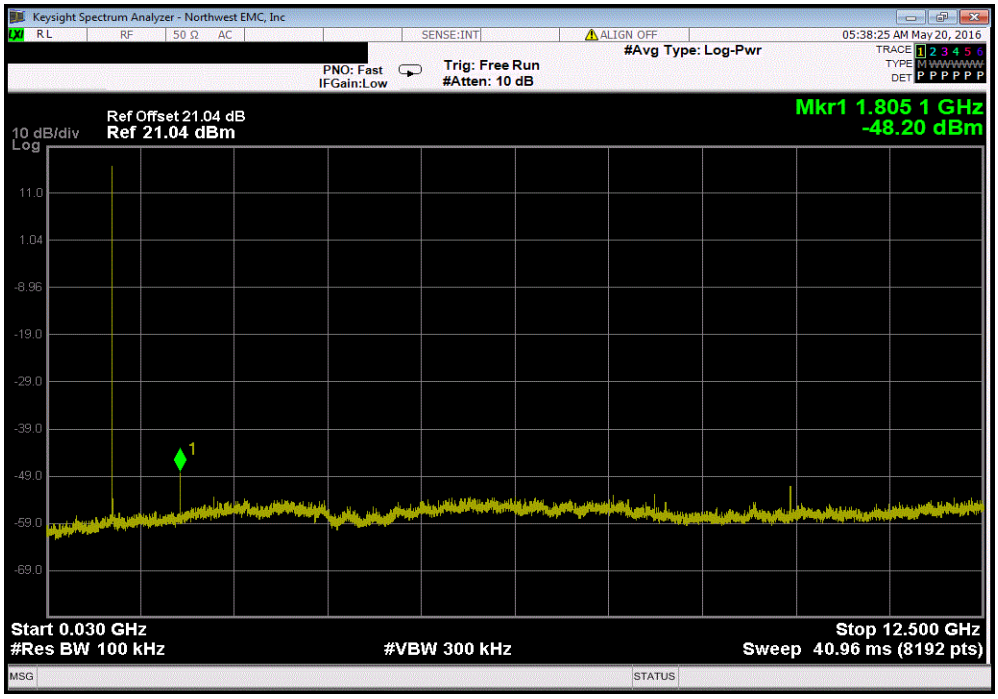
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-55.54	-30	Pass



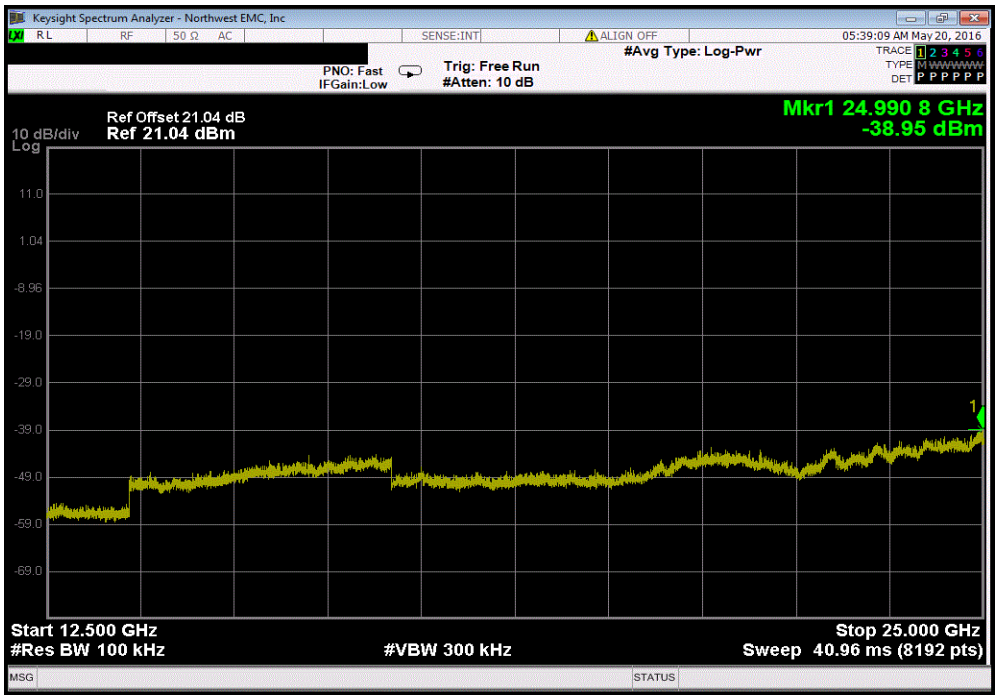
Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



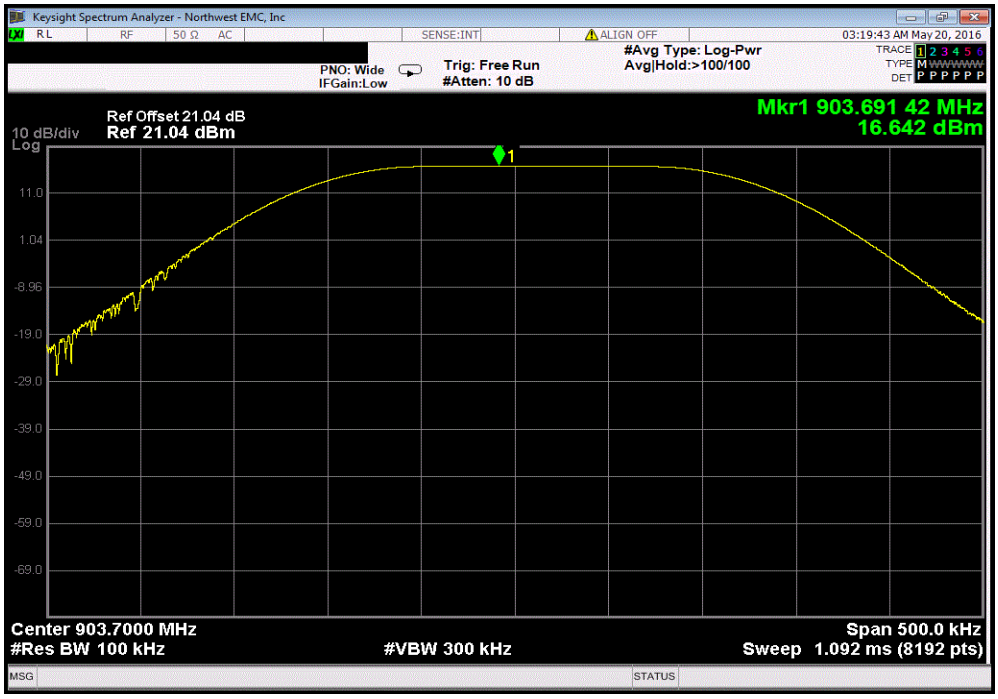
Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-64.86	-30	Pass	



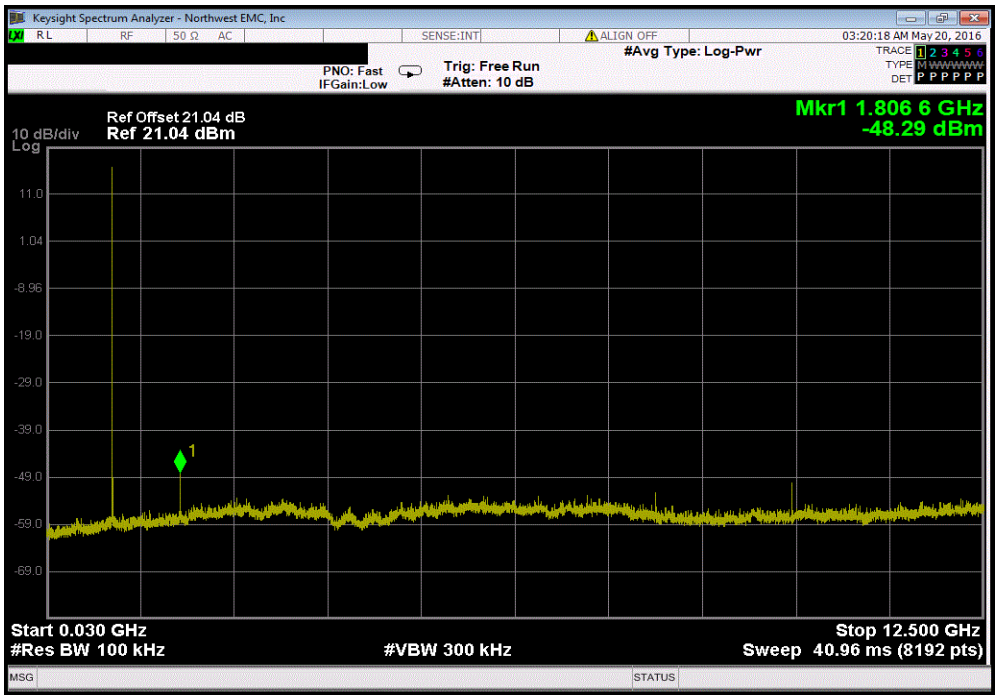
Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-55.61	-30	Pass



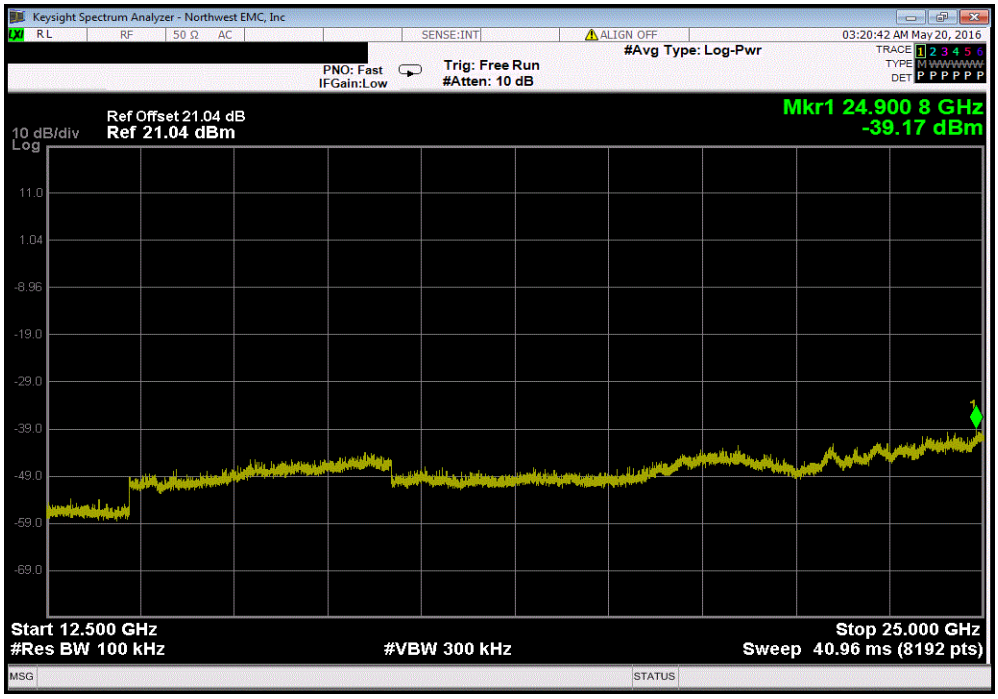
Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-64.93	-30	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-55.81	-30	Pass



POWER SPECTRAL DENSITY

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW using the 11.10.3 method.

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	**FAIRWAYiQ Smart Tag, Model FIQ-01**			**Work Order:**	**RIGA0008**
Serial Number:	**7371**			**Date:**	**05/23/16**
Customer:	**FAIRWAYiQ**			**Temperature:**	**21.8°C**
Attendees:	**Mark Bielman**			**Humidity:**	**44%**
Project:	**None**			**Barometric Pres.:**	**1014 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5VDC via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

The EUT was operating at 100% duty cycle while under test.

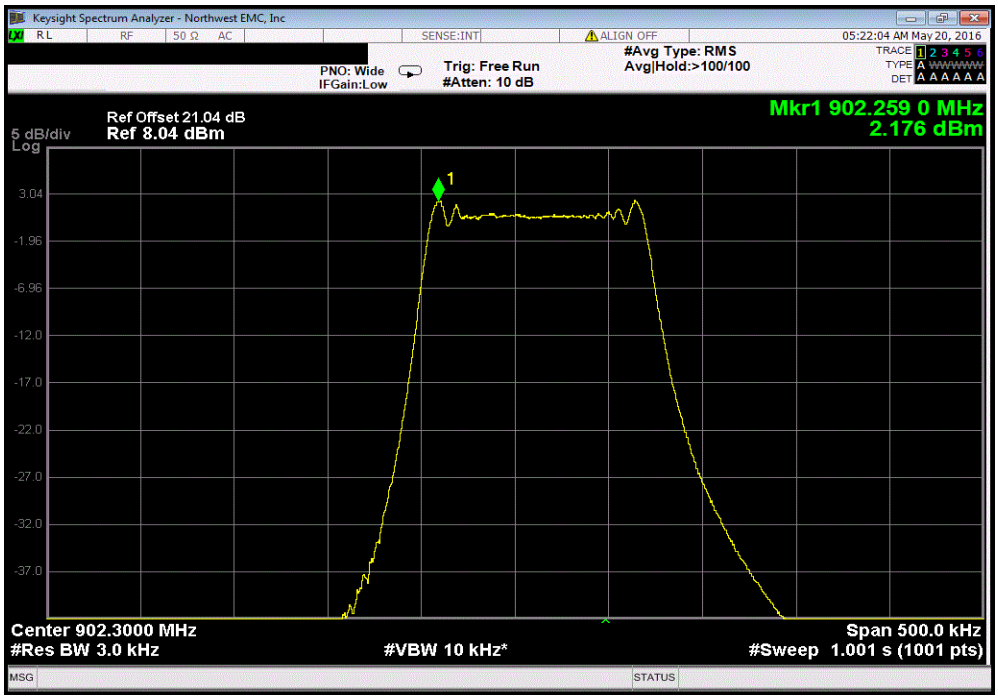
DEVIATIONS FROM TEST STANDARD

None

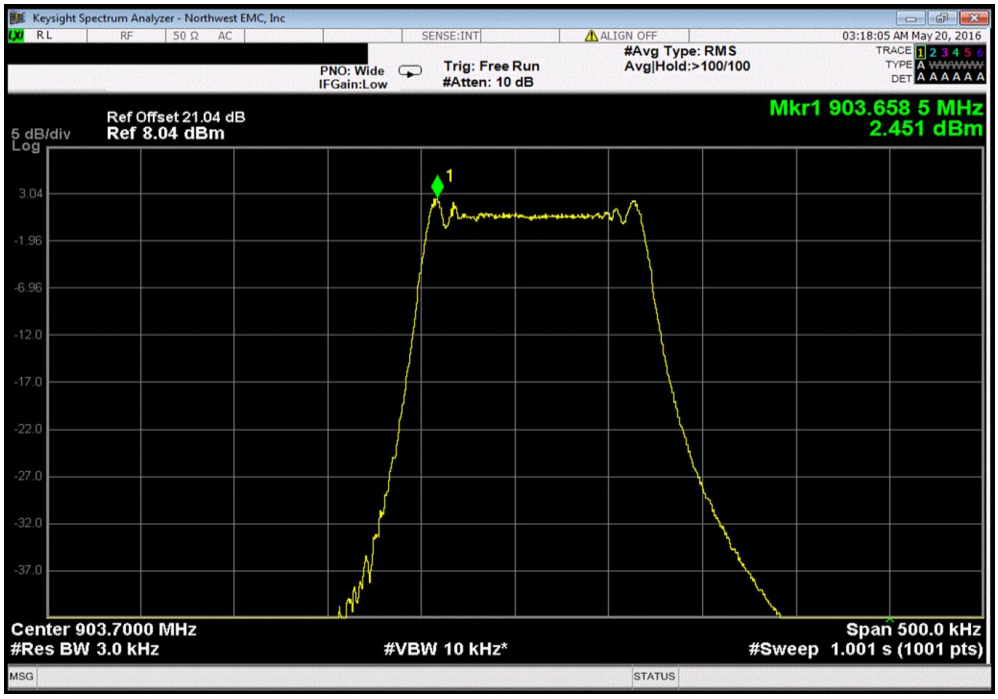
Configuration #	**3**	*Signature*

		Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
Non Hopping Mode				
	980bps (Spreading Factor 10) OBW 125KHz			
	Low Channel, 902.3 MHz	2.17	8	Pass
	High Channel, 903.7 MHz	2.472	8	Pass
	5470bps (Spreading Factor 7) OBW 125KHz			
	Low Channel, 902.3 MHz	2.307	8	Pass
	High Channel, 903.7 MHz	2.359	8	Pass

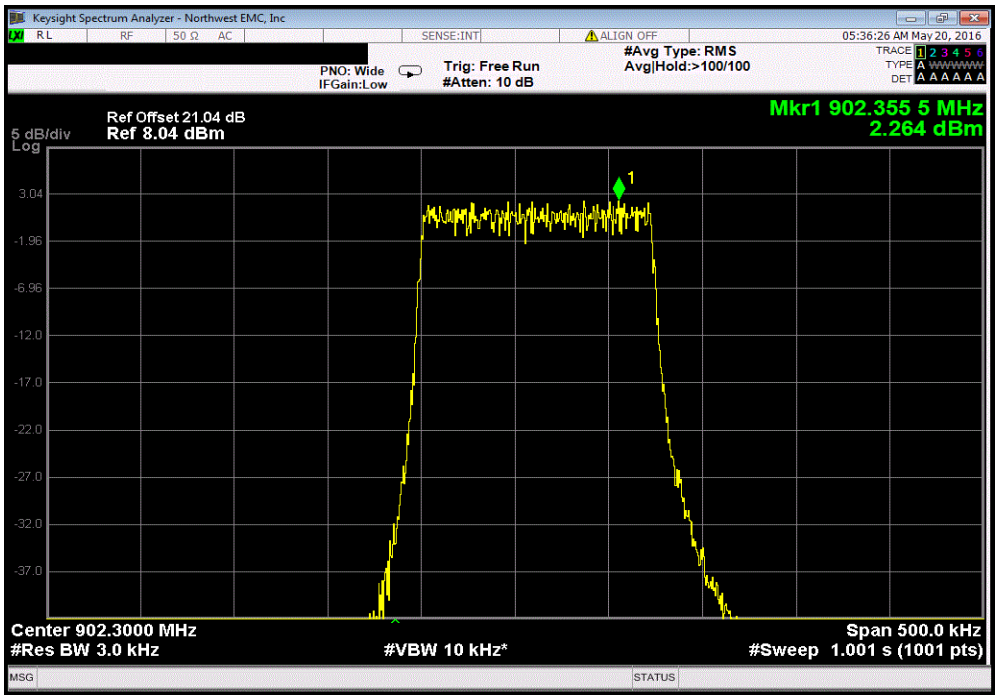
Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, Low Channel, 902.3 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				2.17	8	Pass



Non Hopping Mode, 980bps (Spreading Factor 10) OBW 125KHz, High Channel, 903.7 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				2.472	8	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, Low Channel, 902.3 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				2.307	8	Pass



Non Hopping Mode, 5470bps (Spreading Factor 7) OBW 125KHz, High Channel, 903.7 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				2.359	8	Pass